"THE INTEGRITY OF THE INDEPENDENT TELEPHONE SYSTEM AND ITS UNIVERSAL EXTENSION"

Telephony.

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Telephony.

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Independent Telephone Men

By R. G. Shelden

THERE is a man in Parkersburg, West Virginia, whom the people of that town speak of as "a double-distilled compound of brains, energy, courage and grit, whose constructive work in Parkersburg's interest has made telephone rates so reasonable that a telephone exists in almost every home." That man is A. C. Davis, general manager of the West Virginia Western Telephone Company.

A. C. Davis.

Mr. Davis was born in Harrison county, West Virginia, September 21, 1866, and was educated in the public schools of the state, in Alfred University, New York, and Central University of Indiana. He is a graduate in civil engineering, and in his earlier business career taught in public and private schools, and later was a bookkeeper and auditor. From 1898 to 1901 he was auditor and office manager of the West Virginia Western Telephone Company, and has been general manager since 1901.

Mr. Davis is one of those men who love peace, and spend most of their lives fighting for it. He does not like to fight, and when he has to he puts all his energy into it and has it over with quickly. And it always ends the same way—A. C. Davis wins, because he will not stop fighting until he does win.

Mr. Davis is what is popularly known as a self-made man. He did not have to be; he probably could have had things easy if he wished. But he always had so much energy and enthusiasm that a smooth road looked uninteresting to him. It had to have bumps and sharp turns and adventures along it to attract him. He found it in the Independent telephone field. And there are not many men in that field, or any other, who have done more to show that the hypothetical power supposed to be vested in great corporations is but a bubble to be pricked by an earnest and aggressive man.

Besides his position as general manager of the West Virginia Western Telephone Company of Parkersburg, A. C. Davis has been, at different times in his career, secretary and general manager of the Marietta Telephone Company, of Marietta, Ohio; general manager of the Ravenswood Telephone Company, of Ravenswood, West Virginia; secretary of the Caldwell - Marietta Telephone Company, of Warner, Ohio; secretary, treasurer and general manager of the West Virgina Telephone, Telegraph and Transportation Company, of Parkersburg; secretary of the Oakland Pressed Brick Company, of Janesville, Ohio; secretary of the Parkersburg Novelty and Specialty Company, of Parkersburg; secretary of the Copper Canon Mine and Milling Company and director of the Parkersburg Banking and Trust Company. He is also a director of eighteen other telephone companies, and a member of the executive committees of the West Virginia Independent Telephone Association and the International Independent Telephone Association. A. C. Davis is intensely independent in spirit and action. It is to men like him that the Independent movement owes its virility; and so long as they can secure such leaders, the Independents will prosper.

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Editorial Department

STAND UP!

STEADFAST loyalty and sincerity of purpose count for a great deal in this world. The average man is so constituted that he cannot but respect the person who is in earnest and faithful to his principles even though those principles are not admired by the observer. In other words, all the world loves a "sticker" as well as a lover. Everything worth while that has been accomplished, in fact, has been done by men with the courage of their convictions who held fast to their purpose, fought the good fight and refused either to be cajoled or frightened into swerving from their position.

All of which leads us up to the point that the Independent telephone industry furnishes a fruitful field for loyal endeavor. In fact, the Independent telephone field has room for none other than real, true Independents. The telephone journals that cater to the Independent industry and profess to represent Independent interests should be true blue, and, while retaining the privileges which all journalism worthy of the name should possess, of criticising as well as commending, these publications should preach Independent doctrine and do all they can in every way to advance the cause which they claim to advocate. It all resolves itself into the saying "He that is not with me is against me." There can be no half-way measures in the Independent movement as matters stand to-day. In TELEPHONY's opinion, a man cannot be an Independent on Monday, a Bell man on Tuesday and an Independent again on Wednesday. The Independent field is no place for straddlers or turn-coats.

Independent operators, Independent manufacturers and everybody connected with the Independent telephone field know the value of sincerity and loyalty in the ranks of those arrayed against monopoly. They have learned that value during the stress and trouble of years of hard fighting Some of the weak-kneed have succumbed to the threats or blandishments of the Bell opposition, but the Independent ranks have again closed up, the fight has continued and the accession of new recruits has more than offset the loss and caused the deserters to be forgotten, not missed.

Just at this time the Bell is seeking strenuously to make inroads on the Independent forces. Its manufacturing ally, the Western Electric Company, is bending every energy to wriggle into Independent territory and obtain Independent trade. The Kellogg Switchboard and Supply Company, which has not yet been delivered from the Bell control by the courts, is doing the same with a more plausible face and, undoubtedly, with better success. The fact remains that both are Bell concerns, to all intents and purposes, and should be shunned by loyal Independents, for the reason that Independent trade rightfully belongs to Independent manufacturers who have made possible an anti-monopoly telephone industry. Now, as ever, Independent telephone men should stand by their guns; they should stand by their friends; they should stand by each other. The Bell was never more intent on breaking down the Independent defenses than it is to-day. It is trying every scheme imaginable to throw the Independent forces into confusion, for never before was the inherent strength of the Independent cause so manifest as it is at the present time. It is needless to add that the Bell monopoly's machinations will fail as they have failed in the past. All the Independents need to do is to stand fast and remain loyal to their organization and each other. Let every Independent telephone man keep the shield untarnished. Let him stand up and answer when the roll is called!

BETTER TIMES COMING.

THE most careless glance at the business horizon is sufficient to perceive a decidedly more sunny tinge in the skies than was apparent a few months ago. As the old song had it, "the clouds are all breaking away," and things generally are brighter. The boom times of a year ago are not returned by any means, but all will agree that conditions are steadily improving. As might be naturally expected, the telephone industry is the first to feel the uplift resulting from bettered conditions. As a matter of fact, the telephone field escaped very lightly, comparatively speaking, during the recent financial depression, the reason being, of course, that the telephone has become so essential a factor in the world's work that no matter whether there are good or bad times the public must use the telephone as they must use the street cars or any similar utility.

Realizing this fully TELPHONY has never been discouraged over the future prospects of the telephone business. It is, however, extremely gratifying to observe the constantly improving trend in all business lines. The big manufacturing corporations and railroads are putting thousands of additional men to work, there is an increased demand for all kinds of material and, in short, the "going is good" and getting better every week, as the signs point to big crops and no great disturbance from the presidential campaign.

The following optimistic expressions from leaders of the commercial world are worth reading:

E. H. Gary, chairman of the United States Steel Corporation: "From the viewpoint of the United States Steel Corporation, the iron and steel business has been better during the last two weeks than at any time since the depression of last October. The tendency since the beginning of the calendar year has been toward improvement, with some fluctuations until the readjustments in prices were made in the early part of June, when the placing of orders in some lines was practically suspended. This was because many of those who were contemplating additional purchases were in doubt as to whether or not there would be further improvements. Moreover, there seems to be a general feeling that bottom prices have been reached, and this has increased buying and also increased specifications against old orders. It is hoped present conditions will at least be maintained during the summer, although it is not expected business will be brisk or entirely satisfactory during the next sixty days, nor until after the November election. When that time arrives it seems to some of us at least the iron and steel industry of this country will be prosperous. The necessities of the purchasing community are greater than ever before and the ability to pay is greater than ever before. Of course the latter part of the statement is subject to some modification. Many of the railroad companies are at present embarrassed by reason of the lack of funds, but these

difficulties will surely, even though gradually, be overcome. Many of the railroad companies have already taken steps to finance their requirements and all are beginning to realize that money is plentiful and cheap and easy to obtain when first-class securities are offered. All that is requisite to bring about satisfactory business conditions is to restore public confidence, and that time appears to be at hand."

Marshall Field & Co.: "In response to the numerous inquiries from the trade asking for an expression of views on market conditions, we wish to say that, for the first time in many weeks, in fact since our first sharp reduction of prices in the fall of 1907, we are of the opinion that as a result of the readjustment which has been made in prices since that date, values of most staple merchandise have now reached their proper level. * * * Prices are tending higher rather than lower on most staple lines of cotton piece goods, outing flannels, blankets, wash dress fabrics and kindred lines. We believe that merchants can now replenish their assortments with full confidence in the firmness of the present market."

James W. Van Cleave, president of the National Association of Manufacturers: "Conditions throughout the country point to an early return of prosperity. Bank clearings, and railroad earnings are below those of a year ago, but the gap is steadily narrowing. There are fewer idle cars than there were at the beginning of June. The July interest and dividend payments this year in New York will be $177,000,000, as compared with 184,000,000 in July, 1907. Thus the falling off is far less than had been expected. About $46,000,000 of gold has been exported since the present outward movement began in the middle of April, but as we gained over $100,000,000 of gold in November and December last, and as we can get as much as we need from the outside world at any time we may need it, this movement does not disturb anybody. The rates for money are about the same as they are in midsummer of normal years. 'Re-employment days' are becoming general. St. Louis had one on June 1, when 15,000 idle persons were put to work. On a far larger scale the Pittsburg district had one on July 6, when every plant of the United States Steel Corporation, the largest concern in the world in its field, resumed operations. The other shops of that corporation, all over the country will, it is expected, all be running by August 1. All the independent steel concerns in the Pittsburg district, it is announced, will be at work with a full force by the first week in August.

"The Department of Agriculture in Washington says the crop outlook is better, on the whole, than it ever was before at this time of the year. It estimates that the value of the country's farm products of 1908 will reach the $8,000,000,000 mark. This will leave all records far behind. It will be more than double the value of the farm yield of 1900, which was $3,764,000,000. Big crops have always heretofore meant good times for the country, and they will mean the same this year."

J. Ogden Armour, head of Armour & Co., Chicago: "So far as this country is concerned, I can see nothing but prosperity ahead. Of course I anticipate that times may be somewhat 'slow,' but there are no serious forebodings, as far as I can see."

KELLOGG COMPANY STILL BELL.

ON JUNE 30, 1908, the Branch Appellate Court handed down a decision in the Kellogg Switchboard and Supply Company case which did not give the relief desired by complainants and which leaves the Kellogg company still in the hands of the Bell. The Supreme Court may decide the case finally at the October session, or the litigation may be long drawn out. Immediately after the decision Milo G. Kellogg, who is the most interested of the litigants, sent TELEPHONY the following signed statement in reference to the decision:

The Branch Appellate Court on June 30, 1908, rendered its decision in the suit of Dunbar et al. vs. American Telephone and Telegraph Company et al., concerning the stock ownership of the Kellogg Switchboard and Supply Company, in which they held with Judge Windes of the Circuit Court that the material allegations of the bill of complaint were proved, but held that the relief granted should extend only to an injunction against the voting of the stock in question and against its receiving any further dividends on the stock. They said that the 1907 stockholders' meeting did not elect directors because there was not any quorum present and the by-laws of the company require a majority. The decision is so inadequate in the relief given, on any theory of the case, that it does not seem that it can for a moment stand in the Supreme Court. The Appellate Court heard the arguments in the case on June 12, 1908, and agreed at that time that it would render a decision by July 15, so that the case could be heard by the Supreme Court in October. It seems evident that the real purpose and intent of the decision of the Branch Appellate Court was only to render such a decision in the case as would leave the management of the company *in statu quo* for the comparatively short period before the court of final resort could determine the exact relief to which the complainants were entitled. As the Supreme Court has already held, when the case was before it on demurrer, that if the allegations of the bill were true, the purchase of the stock was an *absolute nullity* and no title to the stock passed from the original owners, it seems to be a foregone conclusion that the Supreme Court will decree full relief in accordance therewith and, in effect, that I be reinstated in control of the company. . It is my confident expectation that such will be the result.

TELEPHONY sincerely hopes that Mr. Kellogg and his associates secure control of the Kellogg company, but until they do the company must continue to be branded as a Bell manufacturing concern to be shunned by all Independent telephone men. As the situation stands to-day the Kellogg company is working hand and glove with the Western Electric Company, it is manufacturing apparatus for Bell companies, and conducting a campaign which shows conclusively where its allegiance lies. There should be no misunderstanding on this point—The Kellogg as it stands now is Bell.

If any one tries to tell you Kellogg is not Bell ask him why Western Electric Company traveling men carry Kellogg specifications. Tell him that on May 4, 1908, a Western Electric salesman of the name of Airline told the Eaton Telephone Company, North Eaton, Ohio, that he could furnish Kellogg party line equipment, and he landed the Eaton order. The same proposition was made by the Western Electric Company man at Avon, Ohio, to the Avon and Sheffield Telephone Company. We believe the Kellogg Company will acknowledge it has manufactured apparatus for the Chicago (Bell) Telephone Company, Central Union (Bell) Telephone Company, Missouri and Kansas (Bell) Telephone Company and Western Electric Company.

A well-known telephone traveling man in a recent communication to a man in Iowa said:

"I have been interested in a copy of your letter in reference to the Kellogg situation. Of course, this matter has been thrashed and re-thrashed so that we do not doubt but that you are sick of it. But you are not more sick of it than the writer is personally of the Kellogg competition we have had in the past. I can recite numerous cases that would prove conclusively to you just where the Kellogg company stands.

"For instance, when the Sheboygan, (Wis.), switchboard contract was let, all companies were invited to compete, the Sheboygan company refusing to be held to the Western Electric prices. You will be interested to know that the Western Electric Company's price was originally put in at about $25,000 and the Kellogg company did not get active on this proposition at all which would look suspicious. When the Western saw it was about to lose out, it cut its price to $15,000, about $2,500 under the Kellogg company. Later on, I was talking to one of the salesmen of the Western Electric Company who is a personal friend

of mine. He told me that the Wisconsin Bell was trying to handle that proposition and sent into the factory for help when it saw it was going to lose. He said that as he had no information he went over to the Kellogg company and got their dope on the subject. That is the way he put it to me. Not long afterwards in the same territory, a switchboard was purchased by the Fox River Telephone Company of Appleton, Wis. The Bell company was not bidding on this. However, the Kellogg Company's figure on Appleton was comparatively thirty per cent under the one it put on Sheboygan. Could you draw any conclusions from the method of handling this and with the information secured from my friend in the employ of the Western Electric Company?

"There are numerous instances but I will give you one or two more. It is a fact that the Kellogg company built private branch boards for the Central Union. Another instance when prices were asked on the Mt. Vernon, Ohio, plant, the Kellogg representative afterwards made the statement, to the manager of the Mt. Vernon company: If you would have given us any show on this proposition, we would have put in a figure that none of the rest of the companies could have met. And if you had only been in my position selling in competition with them, you would realize how true this statement has been in the past.

"I find that the Western Electric, in the past year, has been unable to make deliveries to the Pacific States (Bell) Telephone and Telegraph Company. The Los Angeles exchange being up against it for material, drew on the Kellogg company for relays and if you care to take a trip to Los Angeles, you will find in one of their offices a number of Kellogg relays working side by side with the Western Electric Company's relays; and just the other day, Mr. Downs, now traffic manager for the Pacific states with headquarters at San Francisco, was explaining to me that these relays were not holding up as well as the Bell company's relays. How could you explain this condition? Would not this one item alone be enough to convince you of the relationship existing? Personally, I am unbusinesslike enough to be sentimental in the Independent field and was certainly pleased by the spirit expressed by Mr. Devin, the secretary of the Home Telephone Company at Mt. Vernon, Ohio, who stated emphatically to me that he would not use one screw of Kellogg manufacture if he could secure any kind of equipment that would operate in the Independent field. I could give you many more points along these lines, but I do not wish to worry you. However, I trust that this letter and the facts contained, will interest you."

After reading the above what do you think of the Kellogg company's status? TELEPHONY's opposition is based on facts. This publication will not stand for a wolf parading in sheep's clothing, and consequently, cannot recognize the present Kellogg outfit as entitled to any consideration from Independents. We intend to fight the Bell company and its allies, and show up the methods used in trying to throttle competition. We will appreciate assistance from our readers who can furnish us facts and figures concerning the Kellogg and Western Electric Companies and their methods.

THE RICHMOND SITUATION.

PURSUING its customary tactics with the intention of breaking through the Independent telephone defenses, the Bell has put over a deal at Richmond. Ind., whereby the monopoly secures local connection with the Independent Company at that place in return for long-distance service over Bell lines. The contract is between the Central Union (Bell) Telephone Company and the Richmond Home Telephone Company, of which A. C. Lindemuth was then president. The fact that Mr. Lindemuth was president of the International Independent Telephone Association made the Bell all the more eager to complete the negotiations, and since then the agents of the trust have industriously tried to make capital out of the fact that the Bell succeeded in making connections with a company with which an officer of the International association was identified. The record in the case, however, plainly shows that the Bell has nothing to chuckle over, inasmuch as the negotiations were kept a secret from Mr. Lindemuth. Furthermore, he promptly resigned from the Richmond company when he learned what had been done. He also resigned the presidency of the International association in order that no taint of Bell affiliation should attach to the association which now, as ever, is unalterably opposed to any connection with the Bell monopoly.

The following letter shows the secrecy observed in making the Central Union-Richmond Home agreement:

The Richmond Home Telephone Company, Office and Exchange, 25 North Ninth Street, Richmond, Indiana, July 17, 1908.
Mr. A. C. Lindemuth, Chicago, Ill.

Dear Sir: I am authorized by the directors of the Richmond Home Telephone Company to say that they regret that your position as president of the International Independent Telephone Association made it necessary for them to conduct the negotiations and consummate the contract recently made with the Central Union Telephone Company without your knowledge or consent, and hope that you will not consider their action in any sense a discourtesy. They fully appreciate that, while you are president of the Richmond Home Telephone Company, your greatest interest and allegiance are with the International association, and whatever you may deem it your duty to do as president of the International association will be considered as a discharge of an official duty and in no sense disloyal to the Richmond Home Telephone Company. The majority of the stockholders of this company believe it for the best interests of the Richmond Home Telephone Company to connect with the long distance lines of the Central Union Company, and while the policy of the International association is against such connections, we sincerely desire in all other respects your good will and influence for the welfare of the Richmond Home Telephone Company. Very truly yours,

THE RICHMOND HOME TELEPHONE CO.,
(Signed) L. E. Browne, Secy.

Immediately upon hearing of the deal Mr. Lindemuth forwarded his resignation to the Richmond company. His letter follows:

July 1st, 1908.

To the Board of Directors of the Richmond Home Telephone Company, Richmond, Indiana.

Gentlemen: The action of the Richmond Home Telephone Company in agreeing to connect up and interchange business with the Bell Telephone Company, the only competitor of the Independent system at Richmond and elsewhere, being wholly inconsistent with the policy of the International Independent Telephone Association and against the best interests of all the Independent telephone companies of the country, and of the public at large, I, therefore, hereby resign my position as president of said company, the same to be effective at once. Yours respectfully,

A. C. LINDEMUTH

A week later Mr. Lindemuth sent the following letter to the International association:

Chicago, Ill., July 8th, 1908.

To the Executive Committee of the International Independent Telephone Association.

Gentlemen: Owing to the action of the Richmond Home Telephone Company in entering into a contract with the Bell company to take onto its board the long distance lines of the Bell company and to interchange business with it, I herewith tender my resignation as president of the International Independent Telephone Association, and urge that the same be accepted at once.

While I was nominally the president of the Richmond Home Telephone Company, I have been absent from Richmond since the first of February, residing in Chicago, and have been so wholly occupied with the affairs of the association that I have not kept in close touch with my home company, and the contract above mentioned was made wholly without my knowledge and consent, and I am informed by the directors the matter was purposely concealed from me because of my known opposition to, and disapproval of coalitions with, the Bell company and my probable interference therewith.

No one could possibly regret this step on the part of the Richmond company more than myself, and no one would have been willing to do more to have prevented it than I, had I known that the contract was seriously contemplated. The situation, however, has placed me personally and the association in an embarrassing position. My personal embarrassment, knowing my innocence, in the matter would have given me little concern, but I do not wish

the Independent cause or the International association to suffer by reason of this unwise action of the Richmond company, and I, therefore, think it best to step aside as the official head of the Independent organization.

All, I think, know from my address and writings that it was my ambition to assist in building up a great Independent telephone system, and I now feel more earnest and determined than ever to see that result accomplished. Very respectfully,

A. C. LINDEMUTH.

Following Mr. Lindemuth's resignation a conference was held at the International association headquarters in Chicago and the following official statement was made of the meeting:

Probably one of the most important conferences and most far-reaching in its effect in the telephone field, was concluded in Chicago yesterday. It was attended by the officers and executive committee of the International Independent Telephone Association and representatives of the large Independent companies in the United States. The question of the proposed merger and unlawful combination between the Bell companies and a few of the Independent telephone companies had been under serious consideration for some time and the feeling prevailed that the merger effected and contemplated are unlawful and monopolistic in character.

With a view to prevent further action of this kind and the nullification of existing arrangements, as well as the institution and prosecution of criminal proceedings, where the same may be applicable, a large fund was subscribed, $40,000 of which was made immediately available. A committee representing the interests present was instructed to employ counsel and institute suits, wherever in its judgment such action would lie. It was stated that while the properties involved represented but a very small proportion of the Independent interests in the United States, it was deemed wise to take this action at this time in order that there might be no misunderstanding as to the attitude of the International association and the larger Independent companies. The fixed determination is to maintain the integrity of the Independent telephone interests and prevent action which might tend towards a return of monopolistic conditions in the telephone business. The matter which precipitated this action was the announcement of an agreement between the Central Union Telephone (Bell) Company and the Richmond Home (Independent) Telephone Company of Richmond, Ind.

A. C. Lindemuth, president of the International Independent Telephone Association since last January, was also president of the Independent company at Richmond. The negotiations there were conducted without the consent or knowledge of President Lindemuth, residing in Chicago, and his first information concerning it came through the public press. While this action was taken without his knowledge in order to relieve the association of any embarrassment, he tendered his resignation as president of the International association, which was accepted. He also tendered his resignation as president and director of the Richmond Home Telephone Company. This action was taken as evidence of the disapproval of mergers by Mr. Lindemuth and the International association. Mr. Lindemuth will take active part in prosecuting the several suits. This action promises to be the beginning of the final campaign in the warfare which has existed between those two very large interests for several years. The Independents have approximately four millions of telephones in the United States, and the Bell approximately three and one-quarter millions. It is stated by those present at this conference that the funds subscribed will be duplicated many times if necessary.

P. C. Holdoegel, the vice president of the association, is now acting president in charge of the headquarters.

THE MINNEAPOLIS CONTROVERSY.

THE ordinance introduced into the city council of Minneapolis by Alderman Dwyer with a view to regulate the telephone rates of that city practically standardized the existing rates of the Tri-State (Independent) Telephone Company. This is an interesting commentary on the satisfactory service which the Independent company is giving its subscribers.

It is not at all unusual to find Independent companies operating profitably where Bell subsidiaries struggle along on the verge of bankruptcy, paying no dividends and giving at best but indifferent service. So there is nothing surprising in the action of C. P. Wainman, president of the Northwestern Telephone Company, who appeared before the council committee and argued that the enforcement of the suggested rates would not only cripple his company, but would actually force it to do business at a loss. He stated that his company would be compelled to expend at least $400,000 to comply with the ordinance and that there would be an annual deficit of $69,000 as the result of attempting to do business under the new schedule.

There appears to be a very natural doubt in the minds of the city fathers of Minneapolis as to the veracity of Mr. Wainman's statements, and a disposition to regard them as the feverish protests of a man who stands to lose some "easy money."

But we are inclined to believe that Mr. Wainman, as a Bell employe, is entirely truthful in his statement that his company cannot exist on what means efficiency, growth, and good-sized dividends to the Independent company. The president of the Northwestern Telephone Company has doubtless taken a warning from the condition of the Central Union Bell derelict.

THE AMERICAN EXPRESS COMPANY'S ACTION.

FOR some reason best known to itself and the Bell company, the American Express Company ordered the Independent telephones removed from some of its Indiana offices. It should be remembered in this connection that the Independent telephones in Indiana outnumber the Bell three to one.

L. W. Fargo, vice-president and general manager of the American Express Company, in a long telegram to Theodore Thorward, president of the South Bend Home Telephone Company, kindly offered to reinstate the Home Company's telephones "if free of cost to the express company"; which suggestion naturally caused considerable amusement among the Independent representatives.

Business men of South Bend are intensely interested in the action of the Express company, and cheers followed a motion made by I. A. Sibley, a prominent hardware merchant, who, after a brief talk, moved that the business men of South Bend throw their business and influence to the express companies of the city, excepting the American Express Company on account of the action of the latter in ordering the Home telephone out of its office. The motion and the cheers prevailed with intensity, showing the feeling of business men and others over the action of the express company.

Mr. Thorward explained that the express company was having the service of two telephones for only $12 a year more than it paid for one before the South Bend Home Telephone Company was organized and that for this additional $12 it was able to connect with over 4,000 more subscribers.

AN IMPORTANT DECISION.

JUST as TELEPHONY goes to press, word comes from Lima, Ohio, that Judge Quayle has decided, in the Delphos Suit, that the United States Telephone Company's contract is valid.

The Central Union (Bell) Company, although knowing the Delphos Telephone Company had a ninety-nine year exclusive contract with the United States Telephone Company for toll service, made in 1898, entered into contract relations in 1907 with the Delphos Company to connect the Bell toll lines with said local exchange.

The United States company obtained a temporary injunction under which the Bell lines were kept out of said exchange. In the suit resulting the decision is a splendid victory for the Independents in upholding the exclusive contracts for long-distance service made at a time when the Bell refused all connections or relations with local companies.

This makes illegal all connections by the Bell with Independent companies having similar contracts.

THE CARROLL COUNTY INDEPENDENT TELEPHONE SYSTEM

The Interesting Record of a Well Managed Independent Telephone Company

By E. M. Merrell

THE Carroll County Independent Telephone Company of Savanna, Ill., commenced operations in 1897, and in 1898 had 75 telephones in use. From that time on the business increased by leaps and bounds. In one year, the first year of operation, the new company's business was more than doubled, and the end of 1899 saw 175 telephones in service. So brilliant a record as this seemed almost too good to base any estimate of the future on; but the promise of those early days was amply fulfilled by the increase of 1900, which year enlarged the operations of the exchange to 365 lines. Nor did the next year show any diminution of the strenuous pace the new company had set. When, at the close of 1901, 775 telephone lines were connected to the switchboard, it was decided to incorporate, and in 1902 the papers were taken out.

Naturally, the act of incorporation did not stay the progress of the company in the addition of new lines and the assimilation of new business. Increases went steadily on, and in time a submarine cable was thrown across the waters of the Mississippi river to connect with the Indepedent telephone systems of the state of Iowa.

The Carroll County Independent Telephone Company now operates branch exchanges in Milledgeville, Chadwick, Mount Carroll, Lanark, Shannon, Fair Haven and Thomson, besides the main exchange and headquarters of the company at Savanna—practically every town in Carroll county; in Harper and Eaglepoint, Ogle county, and in Sabula, Jackson county, Iowa. These branch exchanges handle from 150 to 500 telephones each. The farmers have shown their appreciation of the service by subscribing in large numbers, and as a result fully 900 farmers' telephones are now connected to the various exchanges. The total number of telephones operated by the company is in the neighborhood of 3,000.

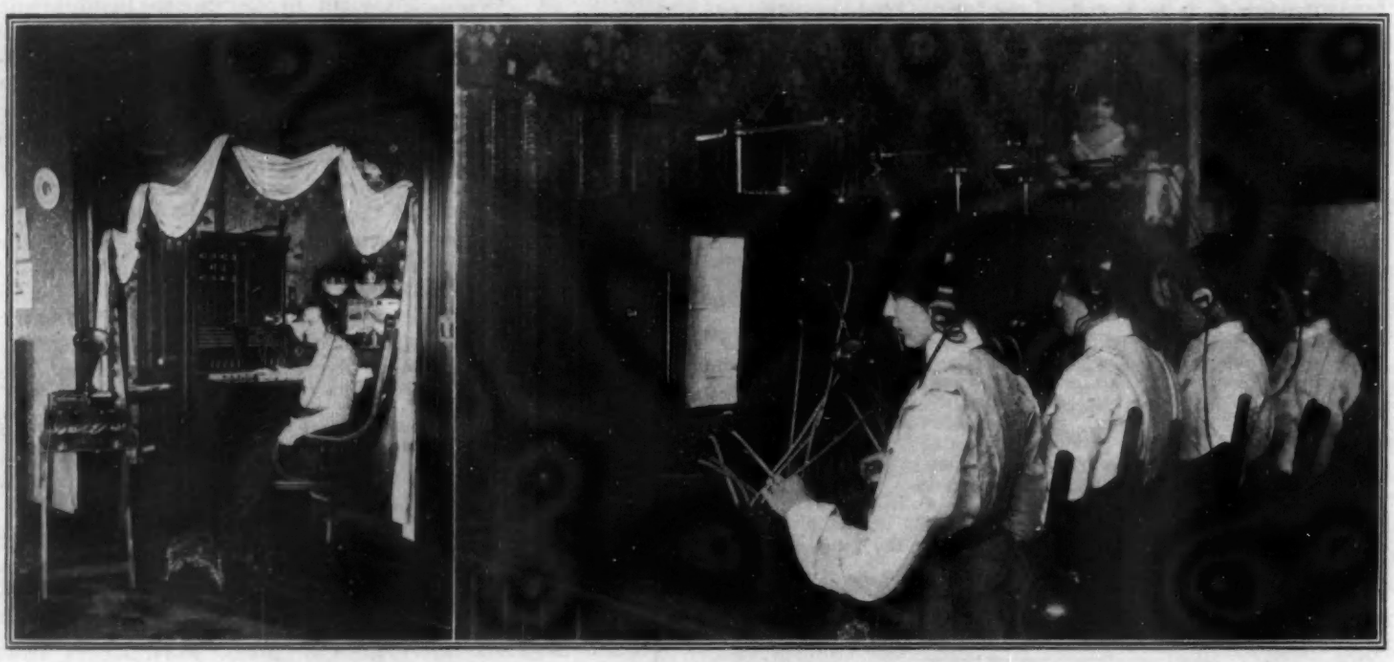
The Carroll County company owns about two hundred and fifty miles of toll lines. In addition to this there is in process of construction at the present time an all-copper toll line between Dubuque and Clinton, Iowa—a distance of seventy-two miles.

In Savanna all wires within the city fire limits, and entering the exchange, are run underground in a modern conduit system. This means over three hundred and fifty miles of wire underground.

In every town where the company operates an exchange, cable is used in preference to open wire leads wherever practicable.

The policy of the Carroll County Independent Telephone Company is to invariably buy the very best of equipment, and to insist on the best construction. Evidence that this policy has been carried out may be seen in the illustrations that accompany this article.

Another feature of telephone work which is more or less neglected by the majority of operating companies, yet which is of the utmost importance to the conditions which make for good service, is the practice of standardization, in so far as the process may be reasonably followed. The Carroll County company has paid especial attention to standard equipments and practice from the operating standpoint, without occasioning any necessity for special demands on the manufacturer.



Carroll County Company's switchboard at Milledgeville.

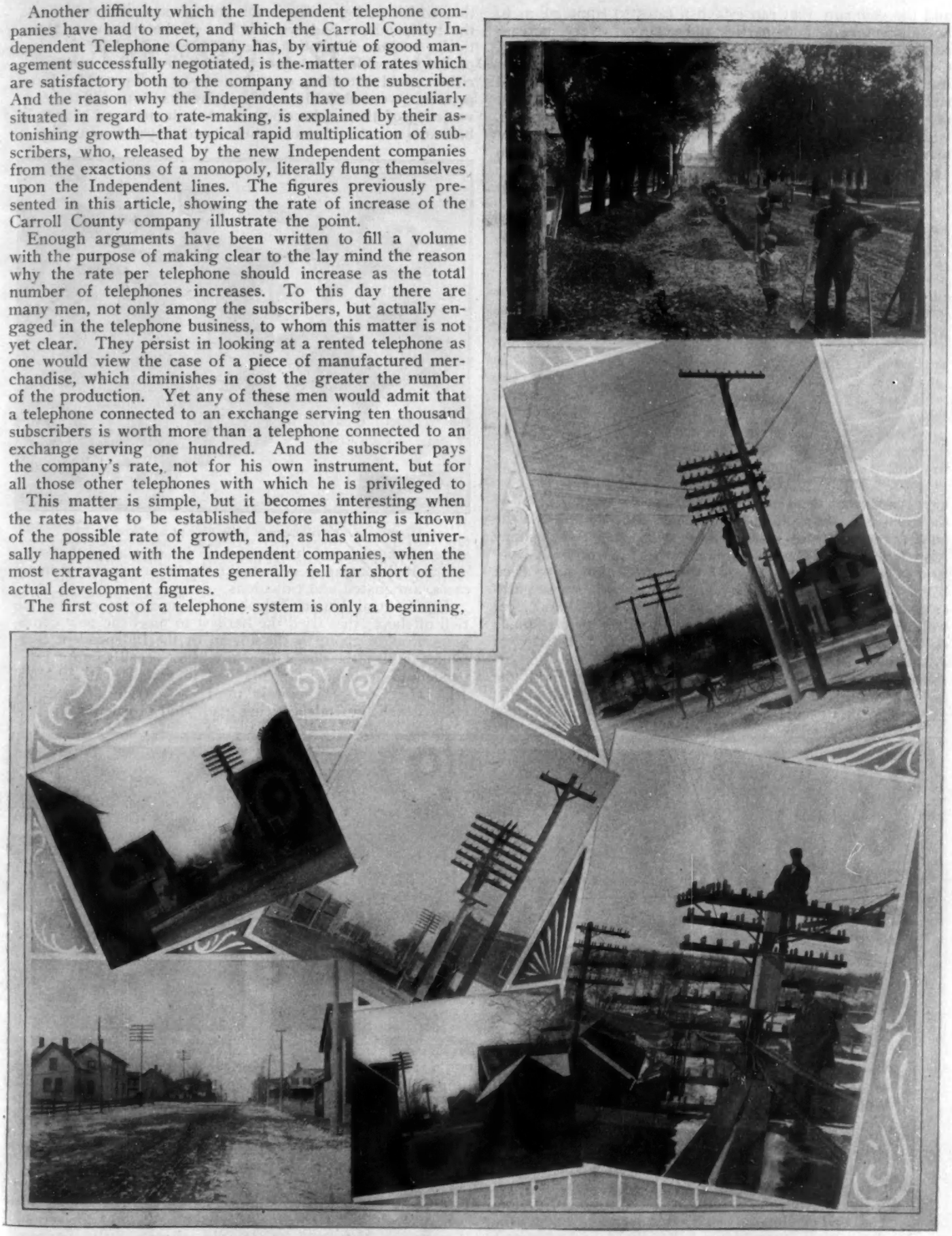
Carroll County Company's switchboard at Savanna, Ill.

Another difficulty which the Independent telephone companies have had to meet, and which the Carroll County Independent Telephone Company has, by virtue of good management successfully negotiated, is the matter of rates which are satisfactory both to the company and to the subscriber. And the reason why the Independents have been peculiarly situated in regard to rate-making, is explained by their astonishing growth—that typical rapid multiplication of subscribers, who, released by the new Independent companies from the exactions of a monopoly, literally flung themselves upon the Independent lines. The figures previously presented in this article, showing the rate of increase of the Carroll County company illustrate the point.

Enough arguments have been written to fill a volume with the purpose of making clear to the lay mind the reason why the rate per telephone should increase as the total number of telephones increases. To this day there are many men, not only among the subscribers, but actually engaged in the telephone business, to whom this matter is not yet clear. They persist in looking at a rented telephone as one would view the case of a piece of manufactured merchandise, which diminishes in cost the greater the number of the production. Yet any of these men would admit that a telephone connected to an exchange serving ten thousand subscribers is worth more than a telephone connected to an exchange serving one hundred. And the subscriber pays the company's rate, not for his own instrument, but for all those other telephones with which he is privileged to

This matter is simple, but it becomes interesting when the rates have to be established before anything is known of the possible rate of growth, and, as has almost universally happened with the Independent companies, when the most extravagant estimates generally fell far short of the actual development figures.

The first cost of a telephone system is only a beginning,



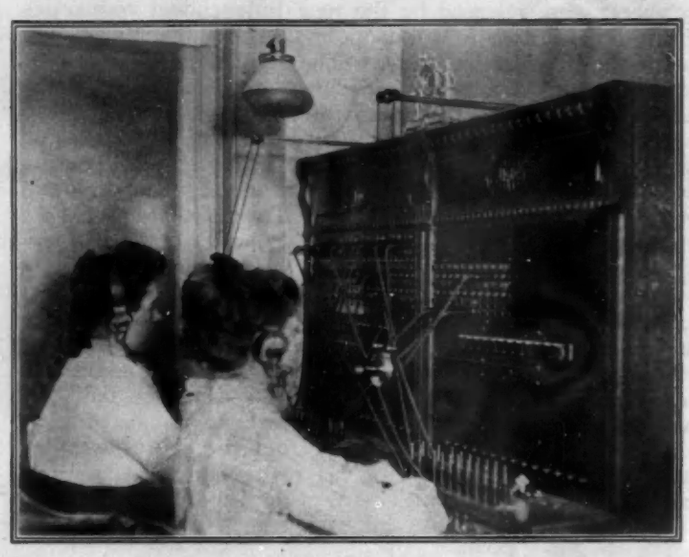
Some vews of construction work on the lines of the Carroll County Independent Telephone Company.

and the company that can establish rates so equitable as to be satisfactory to both parties and yet meet every increase as the conditions of service demand it, as has the Carroll County Independent Telephone Company, may consider itself not only fortunate, but extremely well managed. And a further illustration of excellent direction and management is provided in the fact that the maintenance expense, which in too many cases soars up over the fifty per cent mark, has, in the case of the Carroll County company, been kept down to ten per cent and less.

In the light of this company's development, it is interesting to note that the year which marked the organization of the company, 1897, was also the year which witnessed the inauguration of the International Independent Telephone Association. This body then had its headquarters in Cleveland, Ohio. The meetings of this association have been likened more to political conventions than to business gatherings. Those early combinations of local capital and local enthusiasm, the Independent companies which went to make up the associate body, were keenly alive to the fact that even in this money-making age, the sense of justice and the sentiment of good faith still rule the hearts and minds of the people. Ever democratic at heart, the American public, easy-going though it be, is suspicious of monopoly and unfriendly to its cause. As a rule, local enterprises, "home" industries, are embraced with all the kindness of fellow-feeling, even though the representatives of monopoly offer tempting inducements of lower prices or better goods. The people are fond of trading with those with whom they are acquainted, and whose struggles they have personally witnessed. But the telephone business offered no such condition. The Bell monopoly could offer no inducements that the local company, inexperienced thought it might be, could not only meet, but could successfully improve upon. In that which perhaps affects the public most, its pocketbook, the Independents had ever the best of the argument. Practically without exception, the Independent telephone companies were able to institute rates which the Bell companies either could not meet, or did meet—at a loss. The Independents were able to provide apparatus, both for the convenience of their subscribers in their homes and places of business, and for the convenience and dispatch of the operating work at the exchange, that so far outclassed that used by the Bell companies as to make the latter appear, in many cases, antiquated and ridiculous.

Frank Zinnel.

L. S. Bowen.



Carroll County company's switchboard at Lanark, Ill.

The Central Union Telephone Company is one of the Bell offshoots that tried the hardest to meet the new conditions brought about by the advent of the Independent companies, and is the one with which the Carroll County Independent Telephone Company had to compete at Savanna, Ill. The Central Union in most cases tried to meet the rates which the Independents made and prospered on—and the present condition of the Central Union is well known. It has not paid a dividend for over a decade—not since the Carroll County company started in business.

Carroll County company's switchboard at Chadwick.

Carroll County company's switchboard at Mt. Carroll, Ill.

Carroll County company's switchboard at Shannon, Ill.

The Carroll County Independent Telephone Company has a capital stock of $150,000. Frank Zinnell is president, A. P. Woodruff is vice president and T. S. Bowen secretary and treasurer. The board of directors includes O. A. Manning, George N. Melendy, W. W. Gillespie and George D. Campbell, besides the officers of the company. Mr. Zinnell, the president, is also general manager.

DISPATCHING TRAINS BY TELEPHONE

A Paper Read before the Convention of the Association of Railway Telegraph Superintendents

By W. W. Ryder

THE proposition of substituting the telephone for the telegraph in the handling of trains has in the past been the subject of much discussion.

The electric interurban roads early recognized the desirability of this means of communication for the purpose mentioned, and as the number and speed of their trains and the weight of equipment increased, necessitating a more exact method of despatching, they extended their use of the telephone until it is now recognized by them as the standard method of operation. The steam roads, however, with their ultra-conservatism, were loath to part with the long-established telegraph, and, while a little experimenting has been done from time to time in a very small way, it is only recently that the use of the telephone for this purpose has been attempted on a sufficiently large scale to secure a fair demonstration of its possibilities. The immediate incentive for these experiments was the near approach of the date for the enforcement of the federal nine-hour law, coupled with the well-defined shortage of telegraph operators that had existed for two or three years.

The first experiment on the Chicago, Burlington & Quincy Railroad of handling trains exclusively by telephone was begun on December 11, 1907, on the portion of the main line between Aurora and Mendota, a distance of forty-six miles. Eleven offices were cut in on this circuit. The result was so satisfactory that the construction of another circuit from Aurora to Galesburg, one hundred and twenty-five miles, with sixteen offices, was immediately authorized to handle the dispatching between Mendota and Galesburg. This circuit was completed January 24, 1908, and has been in use regularly since that date. On March 1, 1908, the third telephone circuit was completed. This extends from Clyde, the end of the Chicago terminals, to Aurora, a distance of twenty-eight miles, with fifteen offices. These three circuits are all on double track. March 19, the first installation on single track was completed between Aurora and Savanna, a distance of one hundred and six miles, with twenty-three offices.

Up to this time, while many who personally investigated the matter were willing to concede its efficiency as applied to double track operation, they were very skeptical as to what would be the result on single track. In this distrust they overlooked the fact that in our method of double track operation, the irregularity of reverse movements in reality made the requirements on such lines more exacting than on single track, where opposing movements were perforce the regular method of operation. The results of this last installation were even more marked than on double track, and I am convinced that the handling of trains by telephone is not only much more satisfactory, but is really safer as well, and this opinion is shared by all who have personally looked into the matter.

Believing that the best was none too good for a train wire, we have in each case, with the exception of the Clyde-Aurora circuit, strung two 210-pound copper wires and have made the installation as complete and perfect as we know how. With the present market price of copper, the telephone circuit costs approximately $100 a mile and the station equipment about $50 per station. This is more expensive than the telegraph circuit, and the maintenance will be a little more difficult and the cost a little higher, but the results have proven so absolutely satisfactory, we feel the additional expense is fully warranted.

Our arrangement makes the circuit entirely self-contained, that is, the signaling and talking is all done on the same pair of wires. The signaling is done by semi-automatic selectors that enable the dispatcher merely by the depression of a couple of buttons in connection with a series of synchronous clocks to ring at will vibrating bells in one or more offices on the circuit. This is a much less laborious method of calling, and we also find a very great saving in time, the operators responding very much more quickly than is the practice with the telegraph. In the local offices we put a four-inch vibrating bell, one large enough to be heard at a considerable distance, and when this bell lets go without any preliminary warning, the one thought of the operator is to shut it off and so he immediately answers the call. More often than otherwise the operators to avoid annoyance of the signal bell forestall the dispatcher's call and report trains as soon as they pass.

In handling orders, the same general methods are observed as with the telegraph, any figures or names of stations occurring in the order being spelled out by letter, both in the giving of the order and all of the repetitions, and the name of the conductor on a "31" order is spelled out as well. The use of the telephone is so quick in every way, and so much more flexible, the dispatcher is enabled to get far more detailed information of just exactly what each train is doing, even, when occasion requires, talking directly with the conductor or engineer personally, and is thus brought just so much nearer the actual details of train movement. Only a personal investigation of the scheme can show how valuable is this information.

There has also been a marked improvement in the working of the men on these telephone circuits due to the fact that the conversations between the dispatcher and the operators or other employes are of a much more personal character than obtains with the telegraph, resulting in much closer co-operation. It is even possible to save considerable time in the actual putting out of orders. The dispatcher copies the order in his order book as he talks it off, thus gauging, or rather reducing, his speed of conversation to his ability to write it down, as well as the ability of the operators to do so. Then when the operators repeat the order, they talk it off as fast as they can or much faster than is possible by telegraph.

The change in method in every case was made without a hitch and without any opposition worth mentioning. I had an idea that while possibly the dispatchers themselves might not openly oppose the change, their support might be of a passive character, but in this I was agreeably disappointed. The first circuit had not been in operation a week before a little spirit of jealousy was evidenced, directed against the dispatchers on the telephone circuit, it being so clearly evident they had the "snap" of the office. Soon all the dispatchers in the Aurora office were desirous that we give them the same facilities, and now that all have been taken care of, there is not one of the twelve that would willingly go back to the old method.

It is far easier to educate telephone operators than to

secure telegraphers. There is hardly a town anywhere on the line in which there are not young fellows, who by reason of their frequently being around the depot, are more or less familiar with the railroad game, and who with a very little training would be perfectly competent to sit in as a telephone operator. There is much to be gained by making use of men in their own home towns, or who have grown up along the line. Our telegraph service was at its best when this condition existed to a considerable extent, and discipline has lessened in proportion, as we have been compelled to import telegraph talent.

This increased use of the telephone has also opened an avenue whereby we can offer better employment to those unfortunatly injured in our service, few of whom in the past have been able to learn telegraphy. Another item worthy of consideration is the broadened field from which we can make dispatchers. In the past, the first requisite for a dispatcher was an ability to telegraph, and with the character and ability of telegraphers in general dropping as fast as it has during the past two or three years, we certainly can but expect difficulty in the future in getting satisfactory talent, even if this difficulty has not been greatly in evidence in the past. I maintain that a good, bright, young freight conductor, who has been actually carrying out the train orders, would make a better dispatcher himself and be better able to assist in getting other trains over the road than is the telegraph dispatcher, who, in spite of his occasional trips on freight trains, is a theorist after all.

The establishment of telephone circuits enables us to close unimportant offices wholly or a portion of the time, as a telephone instrument can be placed where the train conductors can readily get in touch with the dispatcher, and report their trains into clear or get help if necessary.

Another important feature in the use of the telephone is the fact that it works even better in bad weather than in good—just the reverse of the telegraph—and if there is ever a time when good service is needed, it is when the weather is wet and foggy. There is no exasperating interference with the dispatcher's efforts by reason of the relay in some way office being out of adjustment and the inattentive operator making no effort to see whether this is the case or not. The telephone is always in proper adjustment, and because of the lowered static capacity of the circuits, works as if charmed. With the telephone, it is possible to arrange apparatus, for instance, in the superintendent's office, so that he can at any time listen to the actual work of the dispatchers and operators and thus check up any tendency to slackness. This has not always been possible in the past, as not all superintendents were telegraphers.

The improvement in the handling of train dispatching by telephone has been so clearly demonstrated, we have decided to attempt to handle other messages in like manner and in a short time all business for the way offices on certain portions of our line (both main and branches) will be handled by telephone, this to include Western Union telegraph business as well. At junction points where branch telegraph lines are to be worked and at certain wire test offices, it may be necessary to maintain telegraph service, but at all other points all classes of business will be handled by telephone.

The field for substituting the telephone for the telegraph daily opens up before us almost faster than we can comprehend it, and the results we are obtaining from our experiments are a constant but very agreeable surprise. For instance, only a short time ago it seemed next to impossible to get satisfactory telephone service on single wire branch lines without completing the metallic circuit and this the volume of business did not warrant. However, latterly we have made successful substitution on two branch lines, one eighteen miles long with three offices, and the other forty-nine miles long with ten offices. These branch wires have been so arranged that while not connected permanently with the main line, they can be connected automatically at the will of the dispatcher or the way office operator, the signaling on the branch being done by means of ordinary bridged bells.

The unqualified success of our experiments with the telephone as a substitute for the telegraph, and the rapidity with which other roads are extending the work, convinces me that the next few months will witness a great change in method of handling trains all over the country, one that will greatly benefit the service.

Roads using telephone for train dispatching and mileage covered by this service, either in actual operation or authorized, are: Illinois Central, 2,536; Chicago, Burlington & Quincy, 746; Chicago & Northwestern, 478; Chicago, Rock Island & Pacific, 333; Michigan Central, 259; Chicago, Milwaukee & St. Paul, 223; Great Northern, 202; Northern Pacific, 109; Baltimore & Ohio, 105; New York Central, 95; Lake Shore & Michigan Southern, 88; Delaware, Lackawanna & Western, 62; Wheeling & Lake Erie, 60; Canadian Pacific, 49; Pennsylvania Railroad (Lines East), 225; Lake Erie, Alliance & Wheeling, 104; a total of 5,674 miles.

The two latter are branch lines operated by bridged bells and hand generator signaling.

REWARDS OF THE TECHNICAL WRITER

Showing the Advantages Gained by the Man Who Commits His Ideas to Paper

By Paul H. Woodruff

TO SOME people — poets, for instance — writing, like virtue, constitutes its own reward. But Americans, even American writers, are an intensely practical race and the question of paramount interest in any undertaking is generally: "How much is there in it?"

The peculiarity of the technical writer is that, as a rule, he is not a writer at all, as the word is ordinarily used. The treatment of technical subjects requires certain professional information which is found only among those actively engaged in the technical industries, so that the task of occasional authorship is assumed either as a more or less profitable side-line, as a means of attaining a certain amount of personal reputation along the chosen line of work, or for the purely scientific satisfaction of conferring immortality upon newly observed facts, or a new point of view.

The complaint is often made by technical men that writing for the technical press does not pay, from a pecuniary standpoint. It may be worth while to consider this question for a moment in passing. Payment for accepted articles is usually at the rate of from $3 to $5 per 1,000 words. To those unused to the work of the pen, the word "thousand" sounds big. As a matter of fact, with a given subject clear in one's mind, the writing of a thousand words should not take over two hours. This will be readily admitted by those whose matter has already appeared in print.

The argument is made, however, that the work of con-

sulting references so increases the actual time of writing as to render the whole proceeding unprofitable. To this there can be but one answer. Every technical man of any experience is sufficiently familiar with at least one branch of his work as to render entirely unnecessary the use of any reference whatever, or at most a mere glance to refresh the memory. There is a tendency among new writers to seek rather abstract and difficult fields, a little outside of their actual experience. They are prone to forget that the very facts which seem so commonplace to them through daily association are the ones they are best fitted to describe, and the ones which fellow workers are most anxious to read. Nor need they, because of familiarity with but one subject, be confined to the writing of but one article. Even the simplest of subjects, with a little study, is capable of almost infinite subdivision and elaboration, and it must be admitted that from $2 to $3 an hour is quite satisfactory remuneration for spare time, even if only occasional.

The man whose knowledge of any subject is thorough and practical is entitled to professional recognition and reputation, just as much as is a doctor or lawyer whose work is helpful to any portion of mankind. By writing for publication under his own name, his ideas, and the fact that he has ideas, are brought naturally to the attention of those who may sometime be of great service to him in the furthering of his ambitions. The method of self-advertising is not only legitimate, but may be considered a most valuable and praiseworthy stepping-stone to future benefits, and the man who takes due advantage of it, as of other means of self-help, is the gainer.

The pure scientist, whose life interest is bound up in the technical work he represents, feels an esthetic enjoyment in the concise array of facts which, when brought together in a new relation, give birth to new facts, or in the developed viewpoint which gives old facts new possibilities. His is the joy of the discoverer or the inventor, aside from any consideration of personal benefit.

Strange to say, none of these reasons for occasional excursions into print reveals the greatest reward of the technical writer. Even among the best informed workers in the technical world, it would be difficult to find one imbued with the belief that his knowledge of any subject is complete and absolutely beyond improvement. Most men are willing to admit that they are learning every day. Their fault, if any, lies in their willingness to let the increase of knowledge be automatic, and to neglect any actual effort to broaden their fund of information.

It is a maxim so trite that its force has been lost sight of, that the surest way of fixing any matter upon the mind is by writing it out. The more carefully the writing is prepared, the greater is the attention given to noting down the details of the subject, the more retentive is the memory of the writer. The educative value of technical writing is immense, and cannot be overestimated. It is infinitely superior to mere reading, however systematic.

The consulting of reference books or papers, under this consideration, becomes a source of the greatest benefit to the writer. Then, too, the marshalling of facts brings out new combinations of thought which in all probability would never have occurred to him in the mere routine of work. So true is this that it may be stated as a fact that it is impossible to prepare an article upon any subject with ordinary care, without knowing more about the subject after writing than before.

And more than this. Problems that seem exceedingly obscure and intricate to purely mental consideration are often solved, as if by magic, as soon as one undertakes to incorporate them into his writing. Ideas are involved, seemingly from almost nothing, that may develop into valuable invention, or even scientific discovery; nor are these original ideas necessarily confined to the subject in hand. One train of thought leads to another with almost automatic precision, and one finds himself at the close of his writing provided not only with ample material for future literary work, but very likely with a new theory or two which he can apply to his daily duties. It is a fact that the mind works fully six times as fast in writing or speaking as it does in unassisted thought.

Take, for example, the subject of repair work in telephone exchanges. One who attempts to prepare an article under this heading must immediately realize that its scope is too broad for one writing. The sub-heads of subscriber's instruments, outside line repairs, and local exchange repairs suggest themselves. At the subscriber's end, the transmitter, receiver, ringer, etc., readily afford material for separate articles. The outside work may be divided in the same way, and the exchange proper offers an almost unlimited number of subjects. Suppose, then, that the writer has arrived at the subject of switchboard cords. He knows that the cords have to be rebutted every so often. He carefully describes the operation. Incidentally, he looks up the methods used by other companies. If he finds a difference between their process and his, he is led to discuss their advantage or their disadvantage, which may be a new line of thought to him. He takes up the matter of patent cords, claimed to require less frequent repair. In describing and discussing them he may hit upon some train of thought which will convince him that some of their claims are illogical and impossible, because what he has written on the causes of wear on the cords throws new light in his mind on the real conditions of service. It is not unlikely that in this connection the embryo form of an idea for a more durable cord may present itself to him. If this idea is on an improved form of butt, perhaps it can also be used on inside cabling. At any rate, it is safe to say that before his article is ready for the editor, the writer will be quite an authority on cords, and will be able to meet promptly any question that may arise on the subject.

This is only one subject out of a hundred or more, and perhaps the least prolific of ideas of any, but it serves to illustrate the developing tendency of the work, as also the expansive possibilities of apparently meager subjects. A growing fascination in the work, an ever increasing fund of valuable information, a remarkable acceleration of ideas, and the sense of increased power which comes to him who is recognized as an authority in his work are the greater rewards of the technical writer.

BROKERAGE WITHOUT TELEPHONES.

ONE morning recently the Chicago board of trade, after indulging in a terrific verbal castigation of the local telephone company, discovered that the terminal box containing all the wires running into the building had been burned out, and as a result they were compelled to accept the inevitable.

In the offices of firms in the building, although the tickers were still working, instead of the hurried snatching of the telephones there were anxious gatherings around the telegraph tables, where everyone with the slightest experience was pressed into service on an occasional unused instrument.

One well known broker stopped long enough in breathless haste to say:

"A bother? Well, I should say it was. Everything is at sixes and sevens. Of course we're trying to do business the same as usual, but when you have been depending on a telephone for years it is like not being able to eat when you are without one."

Another declared that everything was upside down and that there was a continual chorus of complaining and wailing. The accident recalled to many of the old-timers the days when there were no telephones, but conditions were much worse because of the increased volume of business and the modern dependence on the wires.

WIRELESS TELEPHONY

Abstract of a Paper read before the American Institute of Electrical Engineers at Atlantic City.

By R. A. Fessenden

SYNOPSIS.

A. Preface.
B. Brief history of the development of wireless signaling.
First. Introduction.
Second. Period 1838-1897. Origin and development of old or damped wave-coherer method.
Third. 1898. Return to first principles and foundation, on lines antithetical to old, of new or sustained oscillation-non-microphonic receiver method.
Fourth. Fundamental difference between the old and new wireless schools.
Fifth. Period 1898-1902.
(a) Development and perfection of sustained oscillation-non-microphonic receiver method.
(b) Further development of damped wave-coherer method.
General abandonment of old method and adoption of new method.
Sixth. Period 1902-1908. Later developments.
C. Theory of wireless telephony.
D. History of development of wireless telephony.
E. Method and apparatus.
F. Operation.
G. Possibilities.
H. How wireless development has been prevented by governmental action.
I. Considerations.
K. Appendix.

A. PREFACE.

THE discussion of the theory, practical operation, and possibilities of wireless telephony is facilitated by first briefly considering the history of the development of wireless signaling generally.

B. BRIEF HISTORY OF THE DEVELOPMENT OF WIRELESS SIGNALING.

1. *Introduction.* In preparing this note it has been considered best, for the sake of accuracy, to refer to published results, such as scientific articles or theses or patent specifications. For the sake of brevity, references to work done in repetition of previously published work has as a rule been omitted. So far as possible, the expression of personal opinion has been avoided in this section of the paper, the object being to gather together in concise form the facts known in regard to the development of the art. With the exception of Munk's original paper, which could not be obtained, all references have been verified by consulting the original publications, a work of some labor, and if any omissions or mistakes have been made data for their correction will be much appreciated.

2. *Period 1838—1897. Origin and development of Old or Damped Wave-coherer Method.* Joseph Henry, to whose work the development of wire telegraphy owes so much, was the first (1838-1842) to produce high frequency electrical oscillations, and to point out and experimentally demonstrate the fact that the discharge of a condenser is under certain conditions oscillatory, or, as he puts it, consists "of a principal discharge in one direction and then several reflex actions backward and forward, each more feeble than the preceding until equilibrium is attained."[1]

This view was also later adopted by Helmholz[2] but the mathematical demonstration of the fact was first given by Lord Kelvin in his paper on "Transient Electric Currents."[3]

In 1870 Van Bezold discovered and experimentally demonstrated the fact that the advancing and reflected oscillations produced in conductors by a condenser discharge gave rise to interference phenomena.[4]

In 1883 Professor Fitzgerald suggested at a British Association meeting[5] that electromagnetic waves could be generated by the discharge of a condenser, but the suggestion was not followed up, possibly because no means was known for detecting the waves.

[1] Scientific Writings of Joseph Henry, Smithsonian Institution.
[2] Helmholz "Erhaltung der Kraft", Berlin, 1847.
[3] Kelvin, Philosophical Magazine, June, 1853.
[4] Van Bezold, Poggendorff's Annalen, 140, p. 541.
[5] Fitzgerald "On a Method of Producing Electromagnetic Disturbances of Comparatively Short Wave Lengths." Report of British Association, 1883.

Hertz[1] discovered a method of detecting such waves by means of a minute spark-gap and before March 30, 1888, had concluded his remarkable series of researches in which for the first time electromagnetic waves were actually produced by a spark-gap and radiating conductor and received and detected at a distance by a tuned receiving circuit.

Hertz changed the frequency of his radiated waves by altering the inductance or capacity of his radiating conductor of antenna, and reflected and focused the electromagnetic waves, thus demonstrating the correctness of Maxwell's electromagnetic theory of light.

Lodge later in the same year read a paper on the "Protection of Buildings from Lightning,"[2] before the Society of Arts, in which he described a number of interesting experiments on oscillatory discharges.

Great interest was excited by the experiments of Hertz, primarily on account of their immense scientific importance. It was not long, however, before several eminent scientists perceived that the property possessed by the Hertz waves of passing through fog and material obstacles made them particularly suitable for use for electric signaling.

Professor Elihu Thomson in a lecture delivered at Lynn, Mass., on "Alternating Currents and Electric Waves," in 1889, suggested this use.

Sir William Crookes in the Fortnightly Review for February, 1892, discussed the matter in some detail. I quote his statement in part as it shows what a clear conception he had of the possibilities and obstacles to be overcome:

> Here is unfolded to us a new and astonishing world, one which it is hard to conceive should contain no possibilities of transmitting and receiving intelligence.
>
> Rays of light will not pierce through a wall, nor, as we know only too well, through a London fog. But the electrical vibrations of a yard or more in wave length of which I have spoken will easily pierce such medium, which to them will be transparent. Here, then, is revealed the bewildering possibility of telegraphy without wires, posts, cables, or any of our present costly appliances. Granted a few reasonable postulates, the whole thing comes well within the realms of possible fulfillment. At the present time experimentalists are able to generate electrical waves of any desired wave-length from a few feet upwards, and to keep up a succession of such waves radiating into space in all directions. It is possible, too, with some of these rays, if not with all, to refract them through suitably shaped bodies acting as lenses, and so direct a sheaf of rays in any given direction; enormous lens-shaped masses of pitch and similar bodies have been used for this purpose. Also an experimentalist at a distance can receive some, if not all, of these rays on a properly constituted instrument, and by concerted signals messages in the Morse code can thus pass from one operator to another. What, therefore, remains to be discovered is—firstly, simpler and more certain means of generating electrical rays of any desired wave-length, from the shortest, say of a few

[1] Hertz "Electric Waves."
[2] Lodge Society of Arts, 1888.

feet in length, which will easily pass through buildings and fogs, to those long waves whose lengths are measured by tens, hundreds, and thousands of miles; secondly, more delicate receivers, which will respond to wave-lengths between certain defined limits and be silent to all others; thirdly, means of darting the sheaf of rays in any desired direction, whether by lenses or reflectors, by the help of which the sensitiveness of the receiver (apparently the most difficult of the problems to be solved) would not need to be so delicate as when the rays to be picked up are simply radiating into space in all directions, and fading away according to the law of inverse squares.

This is no mere dream of a visionary philosopher. All the requisites needed to bring it within the grasp of daily life are well within the possibilities of discovery, and are reasonable and so clearly in the path of researches which are now being actively prosecuted in every capital of Europe that we may any day expect to hear that they have emerged from the realms of speculation into those of sober fact. Even now, indeed, telegraphing without wires is possible within a restricted radius of a few hundred yards, and some years ago I assisted at experiments where messages were

Figure A.

transmitted from one part of a house to another without an intervening wire by almost the identical means here described.

The statement in the last paragraph of the quotation refers to the work of Professor David E. Hughes.[1] Professors Elihu Thomson and E. J. Houston in 1876 made a number of experiments and observations on high frequency oscillatory discharges.[2]

Professor Dolbear also suggested the same thing in an article in Donahoe's Magazine, March, 1893.

In fact the idea of using Hertzian waves for wireless telegraphy seems to have been quite widespread in the years immediately following Hertz's publications.

Fairly efficient means of generating electromagnetic waves of any desired length had been made known by Hertz. Vertical antennas connected with the ground had been previously used for sending and receiving by Dolbear in 1882 in connection with his system for telegraphing by electrostatic induction[3] and also later by Edison and others.

Hertz's receiver, the minute spark-gap, was not suited for wireless telegraphy and before any telegraphic work could be done a suitable receiver had to be found.

The fact that tubes containing conducting powders had their resistance altered by the discharge of a Leyden jar and that the original resistance could be restored by tapping the tube was first noted by Munk in 1835.[4].

In 1890 Branly showed that such a tube would respond to sparks produced at a distance from it.[5]

In 1892, at the meeting of the British Association at Edinburgh, Professor George Forbes suggested that such a tube would respond to Hertzian waves.

In 1893 Professor Minchen demonstrated experimentally that such powders would respond to electromagnetic waves generated at a distance.[6] He used a battery and galvanometer shunted around the powder to detect the effect of the waves.

[1] For report of this work see Electrician, May 5, 1899.
[2] Journal Franklin Institute, April, 1876.
[3] Dolbear, U. S. patent 350,299, March 24, 1882.
[4] See Guthe "Coherer Action," Transactions of the International Electrical Congress, St. Louis, 1904, page 242.
[5] Branley, Comtes Rendues, 1890, page 785, and 1891, page 90.
[6] Minchen, Proceedings Physical Society, London, 1893, page 455.

Sir Oliver J. Lodge on June 1, 1894, delivered a lecture before the Royal Institution.[1] In this remarkable lecture Lodge described among other things the following:

1. The filings coherer.
2. The filings coherer in hydrogen under reduced pres-

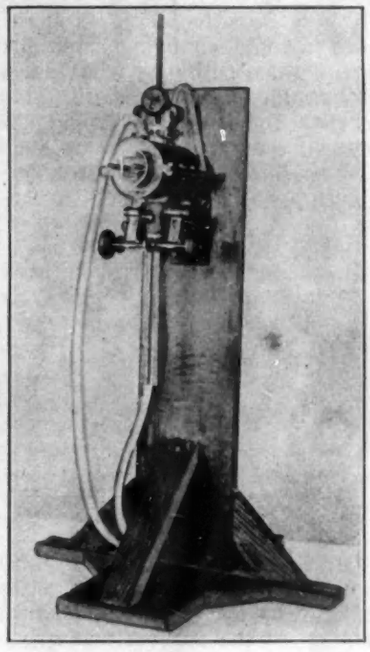


Figure B.

sure (this in a note added July, 1894).
3. The automatic tapper back for the coherer.
4. The metallic reflector for focusing the waves.
5. The connection of the coherer to a grounded conductor; i. e., a gas pipe system.

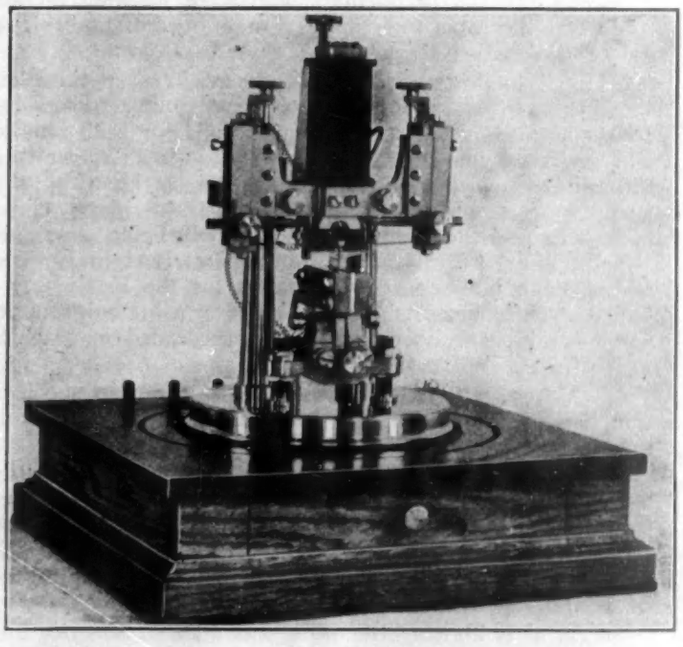


Figure C.

6. The method of making the coherer so connected respond by setting up oscillations in a separate grounded system, i. e., a hot-water pipe system, in another part of the building.

[1] Sir O. J. Lodge, "The Work of Hertz," Proceedings Royal Institution, June 1, 1904, Vol. 14, page 321.

7. The method of detecting distant thunder storms by connecting the coherer to a grounded gas pipe system.

In this lecture Professor Lodge stated that in his estimate the apparatus used would respond to signals at a distance of half a mile.

Early in 1895 Professor Popoff[1] of Cronstadt, Russia, constructed a very sensitive filings coherer, one form of which was used in some surveying experiments by the Russian government,[2], consisting of iron filings suspended by a magnet and resting upon a metallic plate or cup. He used early in 1895, the automatic tapping back mechanism, and substituted for the galvanometer an ordinary telegraphic relay. He operated this apparatus at a distance by

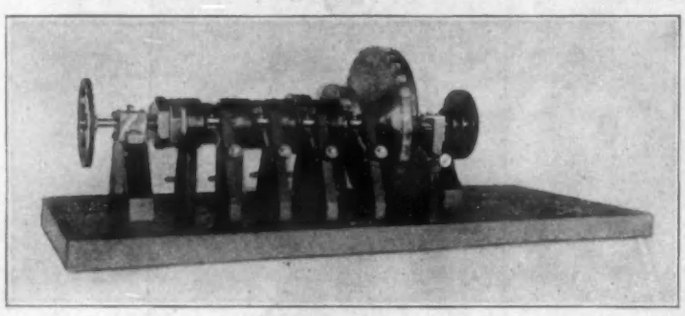


Figure L.

means of a large Hertzian radiator. One terminal of his coherer was connected to a conductor fastened to a mast about 30 feet high on the top of the Institute building and the other terminal of the coherer was grounded.

At the conclusion of his paper, which is dated December, 1895, Popoff made the following statement "In conclusion I can express the hope that my apparatus, with further improvements of same, may be adapted to the transmission of signals at a distance by the aid of quick electric vibrations, as soon as the source of such vibrations, possessing sufficient energy, will be found."

Among other experimenters who were working on this subject at the same time may be mentioned Captain Jackson of the British Navy, and Mr. A. C. Brown.

Marconi, on June 2, 1896, filed a provisional specification[3] showing two forms of apparatus, one similar to Lodge's 1894 apparatus using ungrounded aerials for both sending and receiving and the other for use "when transmitting through the earth or water" substantially identical with Lodge's 1894 and Popoff's 1895 apparatus, with tapper back, etc., and the receiving antenna only being grounded.

Soon after, in July, 1896, Marconi arrived in England and made a number of experiments for the English Post Office at Salisbury Plain and elsewhere, using ungrounded aerials and parabolic reflectors and succeeded in reaching nearly two miles.

On March 2, 1897, Marconi filed the complete specification in which was included a statement that the transmitting antenna also could be grounded.

Lodge filed a provisional specification[4] showing radiating spheres but no antenna on May 10, 1897. The complete specification filed on Feb. 5, 1898, shows as one form both antennæ grounded and also the use of an inductance wound in the form of a coil for the purpose of diminishing the rate of damping of the waves.

So far as is known little work was done in America during this period. The writer made some experiments in 1896 and in conjunction with two of his students, Messrs. Bennett and Bradshaw, did considerable work on receivers of various type in the winter of 1896 and spring of 1897, the results of which were incorporated in a thesis.[1]

3. 1898. Return to First Principles and Foundation, on lines Antithetical to Old, of New or Sustained Oscillation-non-microphonic Receiver Method. Up to the year 1898, as may be seen from the above, the development of wireless telegraphy had proceeded along a single line. In that year, however, an entirely new method of wireless telegraphy was developed, characterized by a return to first principles, the abandonment of the previously used methods and by the introduction of methods in almost every respect their exact antitheses.

While the coherer is of more or less interest theoretically it is not adapted for use for telegraphic purposes. Responding as it does to voltage rises above a certain limit it does not discriminate between impulses of different characters, and is therefore peculiarly susceptible to interfering signals and atmospheric disturbances, and the operation of coherer systems cannot be guaranteed during the summer months or in the tropics. Roughly speaking a coherer acts by starting an arc and making a short-circuit on the line every time a signal is received, which short-circuit persists until it is broken by a blow from an additional mechanism, and such a method of operation is obviously far from practical. In addition it is practically impossible to obtain sharp tuning in a local circuit containing a coherer; its action is always more or less erratic, its electrostatic capacity variable, and it is insensitive.

At the sending end the energy which can be liberated by the discharge of an antenna is limited and in the form used prior to 1897 the dampening is so great that there are only a few oscillations per spark.

Lodge[2] by placing a coil of large inductance in the antenna throttled down the amount of energy radiated per oscillation and so obtained with the same limited amount of energy derived from the charged antenna, an increase in the time of dampening.

Braun[3] patented the method of using a local oscillatory circuit connected to an antenna, the local oscillatory circuit having a much longer period than the natural period of the

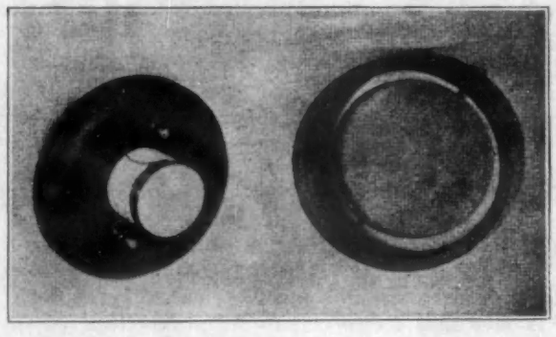


Figure M.

antenna and of a different order of magnitude. Such a system, however, does not radiate energy appreciably, and produces a damped wave.

This dampening and the limited amount of energy obtainable by charging and discharging the antenna operates to prevent sharp tuning and working over long distances.

The coherer is well adapted for working with damped waves, but the coherer-damped wave method can never be developed into a practical telegraph system. It is a question whether the invention of the coherer has not been on the whole a misfortune as tending to lead the development of the art astray into impracticable and futile lines and thereby retarding the development of a really practical system.

[1] Journal Russian Physico-Chemical Society, Vol. 27, April 25, 1895.
[2] A. S. Popoff, "Apparatus for Detection and Registration of Electrical Vibrations," Journal Russian Physico-Chemical Society, Vol. 28, Dec., 1895.
[3] Marconi, Great Britain patent, 12,039, 1896.
[4] Lodge, Great Britain patent, 11,575, 1897.

[1] Western University of Pennsylvania, May, 1897.
[2] Lodge, Great Britain, patent 11,575, 1897.
[3] Braun, German patent, 11,578, Oct. 14, 1898.

The fact that no coherer-damped wave system could ever be developed into a practically operative telegraph system, and the fact that it was necessary to return to first principles and initiate a new line of development along engineering rather than laboratory lines was perceived in America in 1898[1] and a new method was advised which may be called the Sustained Oscillation-non-microphonic Receiver method as opposed to the Damped Oscillation-coherer method previously used.

4. Fundamental Differences between the Old and New Wireless Schools. The differences between the two methods are shown in tabulated form:

Damped Oscillation-coherer Method.	Sustained Oscillation-non-microphonic Method.
A1: Damped oscillations are produced at the sending end.	A1: Sustained oscillations are produced at the sending end.
2: The energy transmitted is obtained by charging the antenna and discharging it.	2: The energy transmitted is derived from a local source and not from the antenna.
3: A spark is used for producing the oscillations.	3: An arc or high frequency dynamo is generally used for producing the oscillations.
B1: Imperfect or microphonic contact receivers are used.	B1: Non-microphonic contact receivers are used.
2: The action of the receiver depends upon the voltage rise and is independent of the amount of energy received.	2: The receiver response is determined by the integral amount of energy received.
3: An open tuned circuit is used for receiving.	3: A closed tuned circuit is used for receiving.
4: The receiving circuit is tuned to the wave frequency only.	4: The receiving circuit may be tuned to a group frequency as well as to the wave frequency.
C1: In transmitting messages the production of the electromagnetic waves is intermittent.	C1: The waves are preferably generated continuously and the transmission accomplished by changing the character of the wave.
2: The wave energy flux is intermittent.	2: The wave energy flux is constant.
3: A high voltage is used.	3: A low voltage is used.
4: Comparatively short wave lengths are used.	4: Comparatively long wave lengths are used.
5:—The signals consist of dots and dashes, whose interpretation is fixed.	5: The signals may consist of dots only, whose interpretation depends on the station sending and receiving.
D1: Antennæ are used adapted, roughly speaking, to utilize the electrostatic component of the electromagnetic waves.	D1: The antennæ are preferably arranged so as to utilize the other component of the electromagnetic waves instead of the electrostatic component.

The history of these two antithetical lines of development will be treated of separately.

5. Period 1898-1902 A. Development and Perfecting of Sustained Oscillation-non-microphonic Receiver Method (a) The current-operated receiver. The first essential for the development of the system was, of course, a quantitatively responsive receiver. Several forms of this were tried including the modification of the Boys' radio-micrometer (consisting of a light thermo couple suspended in the field of a permanent magnet and heated by radiation from a wire which in turn was heated by the current to be detected) described by the writer at the Columbus meeting of the American Association in 1897.[2] This was abandoned in favor of Professor Elihu Thomson's alternating-current galvanometer[3] suitably modified for telegraphic work.[4]

Among other forms of current-operated receiver may be mentioned the following:

The Hot-wire Barretter,[5] consisting of a minute platinum wire a few hundred thousandths of an inch in diameter and approximately a hundredth of an inch in length. The term "barretter" was coined for this device for the reason that it differs essentially from the bolometer of Langley in that it is arranged to be affected by external sources of radiant heat as little as possible instead of as much as possible, and, to have an extremely small specific heat, an object not sought in the case of the bolometer.

The Liquid Barretter[1] in which the change of resistance is effected by heating a liquid, the concentration of path being obtained by means of a fine platinum wire point. Some question has been raised as to the theory of operation of this device but I think there is no question but that the effect is due to heat, though what per cent of the effect is due to change in ohmic conductivity by heat and what per cent is due to depolarization by heat is still, as originally stated by the writer,[2] uncertain. The facts that the device operates practically equally well irrespective of which terminal is connected to the local battery, and that the effect varies as the square of the alternating current (as a heat operated device should do) instead of directly with the alternating current as a rectifier would do, and that depolarization is produced by the heat, have been confirmed by Dr. L. W. Austin.[3] The writer has experimentally determined the fact that though the electrical impulses may have a duration of less than a millionth part of a second the

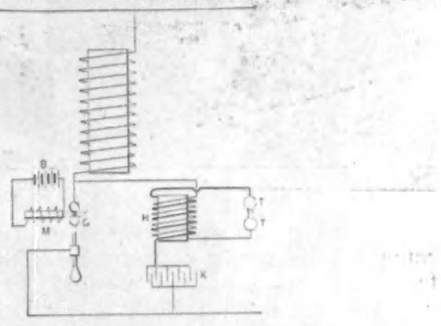


Figure 1.

change in resistance persists for approximately the ten thousandth part of a second, which would seem to show conclusively that the action is not a direct effect of the waves.

(b) Methods of Obtaining Sustained Oscillations. 1. Sparkgap and Local Oscillatory or "tank" Circuit. Professor Elihu Thomson discovered that by using a transformer without an iron core (the well known Elihu Thomson air-core transformer, later used by Tesla and others), and a spark-gap and condenser in the primary circuit and with the secondary circuit suitably tuned great resonant rises of potential could be obtained. In 1892 he constructed such a transformer giving discharges 64 inches long.[4]

The same method was later used by Tesla[5] in his experimental researches and in his attempt to carry out Loomis'[6] method of transmitting a current through a hypothetical conducting stratum in the upper regions of the atmosphere.

The device, suitably modified for wireless telegraphic purposes, so as to give instead of a continuously cumulative rise of potential an initial rise of potential followed by a gradual feeding in of the energy from the local circuit to supply the energy lost from radiation, was made use of in 1898 for the purpose of producing prolonged trains of sustained waves.

Various types of connection between the antenna and the local oscillatory circuit were tested but it was found that

[1] Proceedings American Institute of Electrical Engineers, Nov., 1899. p. 635, and Nov. 20, 1906, p. 781.
[2] Electrician, June 24, 1904.
[3] Elihu Thomson, U. S. patent 363,185, Jan. 26, 1887.
[4] U. S. patents 706,736 and 706,737, Dec. 16, 1899.
[5] U. S. patent 706,744, June 6, 1902.

[1] U. S. patent 727,331, April 9, 1903.
[2] Ibid.
[3] Austin, Bulletin of the Bureau of Standards, Vol. 2, No. 2.
[4] Electrical World, Feb. 20 and 27, 1892.
[5] U. S. patent 645,516, Sept. 2, 1897.
[6] Loomis, U. S. patent, 129,971, July 30, 1872.

the most efficient results were obtained by connecting the local circuit directly across the spark-gap.[1]

The results of some comparative tests are here given. The figures in the column "A" are for the local circuit connected directly to the terminals of the spark-gap, those in column "B" are for an auto-transformer, those in column "C" for a loose coupled primary and secondary.

	A	B	C
Frequency	212,000	212,000	212,000
Tank capacity ..	0.072 m.f.	0.072 m.f.	0.072 m.f.
Kilowatt output dynamo	30	30	30
Tank current ...	400 amperes	370 amperes	300 amperes
Antenna current.	48.5	46.	48.

The large station at Brant Rock is operated with the local circuit directly connected across the spark-gap, partly because the efficiency is somewhat greater, but also on ac-

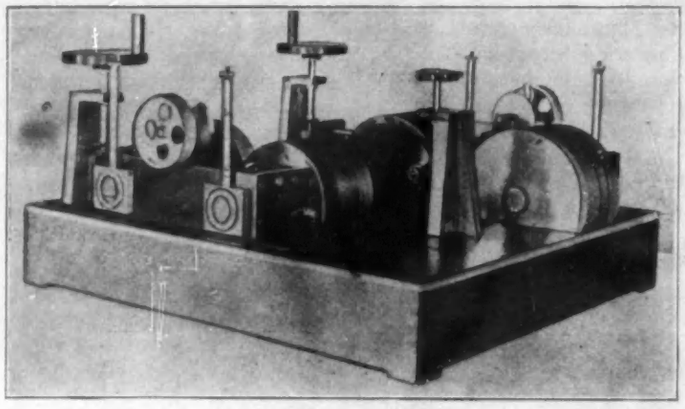


Figure N.

count of the great simplification of connections and the fact that the degree of sustainment of the wave train may be adjusted very simply, if desired, by sliding the lower terminal of the antenna along a few inches of the lead of the local oscillatory circuit.

Cooper Hewitt[2] in 1902 used a modification of his mercury lamp to obtain intermittent discharges each followed by a train of high frequency oscillations.

2. Arc methods. The worker with high frequency oscillatory currents will soon discover that we are indebted to the genius of Professor Elihu Thomson for practically every device of any importance in this art.

The method of producing high frequency oscillations from an arc and continuous current was discovered by him in 1892.[3]. Figure 1, taken from his patent, shows the general form of his arrangement. If the directions given in the specification are followed no difficulty will be met with in obtaining frequencies as high as 50,000 per second.

Between 1900 and 1902 some experiments were carried out with the Elihu Thomson arc as a source of high frequency oscillations for wireless telegraphy and telephony.

Some difficulties were found, for example the arc could not be started and stopped as quickly as was necessary for telegraphic purposes and the intensity of the oscillations and their frequency varied considerably. These were overcome by making some minor improvements, for example the difficulty in sending was overcome by permitting the arc to run continously and using the key to change the electrical constants of the circuits.[4]. The difficulty in keeping the intensity and frequency constant was overcome by substituting resistance for a portion of the inductance, and also by using the arc under pressure.[5]

[1] U. S. patents 706,735 and 706,736, Dec. 15, 1899.
[2] Cooper Hewitt, U. S. patent 780,999, April 25, 1902.
[3] Elihu Thomson, U. S. patent 500,630, July 18, 1892.
[4] U. S. patents 706,742, July 6, 1902, 706,747, Sept. 28, 1901, 727,330, March 21, 1903, 730,753, April 9, 1903.
[5] Ibid and U. S. patent 706,741.

Tests made by Dr. Austin[1] show that with this method frequencies as high as 3,000,000 per second and efficiencies as high as 60% can be obtained together with an absolutely steady generation of the high frequency currents and an absence of harmonic frequencies.

3. High frequency alternator. The first high frequency alternator was built by Professor Elihu Thomson in 1894.[2] And it was while experimenting with it in 1900 that Dr. Tatum made his very interesting discovery that high frequency currents of large amperage could be passed through the body without injury.[3]

From 1898 to 1900 numerous experiments were made on antennæ of large capacity and it was found that instead of using sheets of solid metal or wire netting, single wires could be placed at a considerable fraction of the wavelength apart and yet give practically the same capacity effect as if the space between them were filled with solid conductors.

From other investigations on the variation of radiation with frequency the result was arrived at that it should be possible to construct an alternating-current dynamo of sufficiently high frequency and output to give ample radiation for wireless telegraphic purposes.[4]

In 1900 a large American electrical manufacturing company kindly consented to take up the construction of such a dynamo. As a preliminary, a dynamo of 1 kw. output and 10,000 cycles (shown in Figure A) was built in 1902. By the summer of 1906 many of the difficulties had been overcome and a machine giving 50,000 cycles was installed at the Brant Rock station. Various improvements were made by the writer's assistants, and in the fall of 1906 the dynamo was working regularly at 75,000 cycles, with an output of half a kilowatt and was being used for telephoning to Plymouth, a distance of approximately 11 miles. In the following year machines were constructed having a frequency of 100,000 cycles per second and outputs of 1 and 2 kilowatts.

The credit for the development of this machine is due to Messrs. Steinmetz, Haskins, Alexanderson, Dempster, and

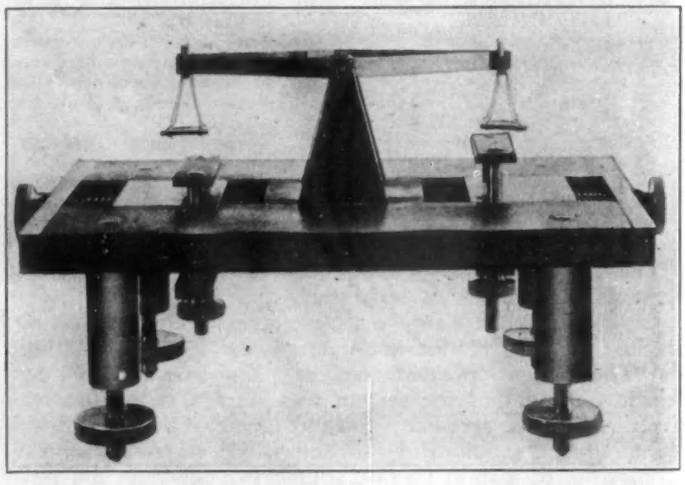


Figure O.

Geisenhoner and also to the writer's assistants, Messrs. Stein and Mansbendel.

(c) Closed tuned circuits. In 1898 the open tuned circuits originally used were discarded for closed tuned circuits[5] and it was discovered that valuable selective effects could be obtained by placing the condenser in shunt to the inductance instead of in series with it.[6]

[1] Austin, Bulletin of the Bureau of Standards, Vol. 3, No. 2.
[2] Thomson, Elec. Engineer, July 30, 1890, and London Elec., Sept. 12, 1890.
[3] Thomson, Elec. Engineer, March 11, 1891.
[4] U. S. patent 706,737, May 29, 1901.
[5] U. S. patents 706,735 and 706,736, Dec. 15, 1899.
[6] Ibid.

(d) Combination of wave and group tuning. The fact that if selectivity is obtained solely by tuning to wave frequencies, the number of stations is limited, was appreciated at an early date. In 1900[1] a new method was developed, the stations being tuned both to the wave frequency and to an independent or group frequency, so that stations might obtain selectivity by varying either the wave or the group frequency and thus have at their disposal a virtually unlimited number of combinations and be practically free from atmospheric disturbances. Figure C shows a type of group tuner.

(b) Further development of damped wave-coherer method. Marconi by 1898 had carried the development of the filings coherer to its maximum point.

Lodge in 1897[2] had disclosed the open secondary circuit for receiving.

Marconi in 1898[3] greatly improved this by adjusting the length of the secondary so as to tune it, and by the aid of this improvement was enabled to telegraph a distance of 35 miles[4] in October, 1899.

Lodge in 1907[5] invented what is perhaps the most perfect aerial with the writer's tuned local circuit or tank circuit for sending, thus obtaining a considerable increase in range of transmission.

In 1902, Marconi invented a very ingenious form of current operated receiver, called the magnetic detector[1], and with this combination achieved some very remarkable results.

In 1905 Professor Fleming[2] invented a very efficient detector based on the "Edison effect" in incandescent lamps, and the observations of Elster and Geitel[3] on the rectifying effect of such an arrangement on Hertzian oscillations.

Virtually nothing was done in Europe in the way of producing sustained oscillations by the arc or high frequency method until recently, possibly because of Duddell's erroneous statement[4] to the effect that frequencies much above 10,000 could not be obtained by the Elihu Thomson arc method, and Fleming's statement[5] that an abrupt impulse was necessary and that high frequency currents, even if of sufficient frequency, could not produce radiation.

In 1903 Poulsen[6] invented an interesting modification of the Elihu Thomson arc, which consists in forming the arc

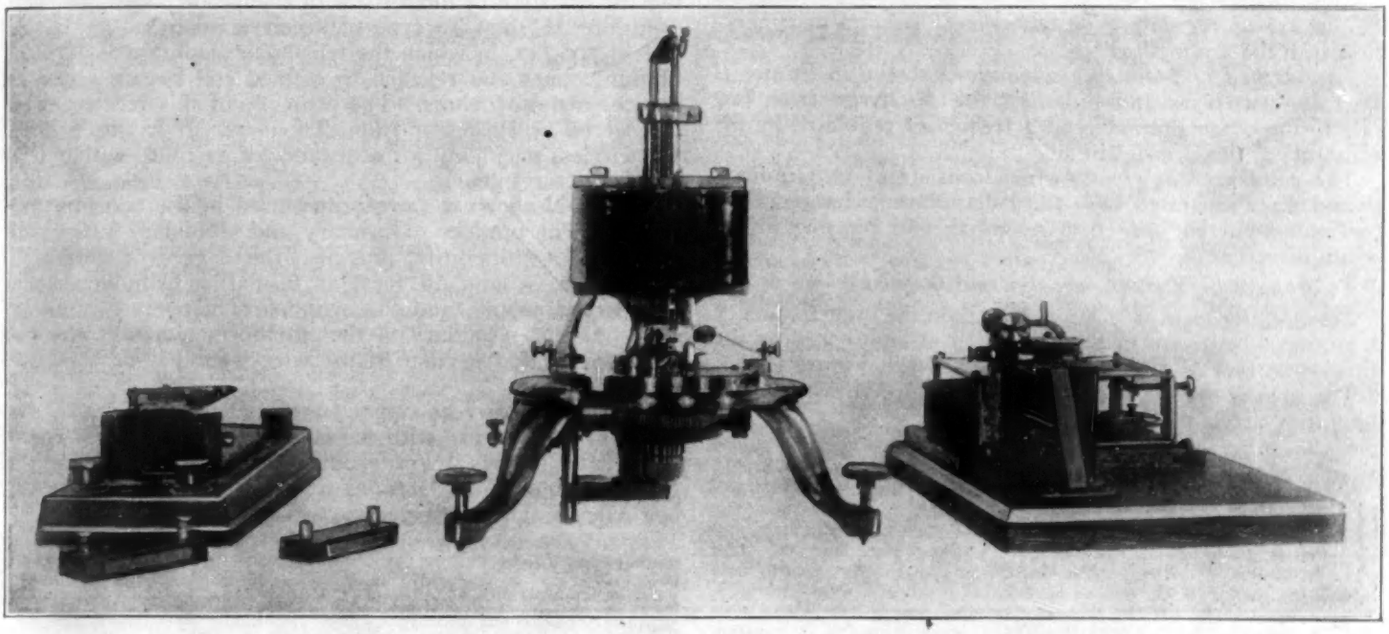


Figure P.

form of coherer, consisting of a thin steel disc dipping in oil covered mercury and automatically decohered by being kept in continuous rotation.

A number of self-restoring coherers of which the Brown[6] carbon coherer may be taken as a type, including the mercury carbon coherer of Solari, came into more or less extended use, and also modifications of the imperfect contact receiver of Neugschwender.[7]

The small progress made along these lines is to be explained by the fact that the damped wave-coherer system is essentially and fundamentally incapable of development into a practical system.

Period 1902-1908—Later developments. Progress in Europe since 1902 has been marked by the gradual abandonment of the elements of the damped wave-coherer system and the substitution of elements of the sustained wave non-microphonic contact type.

In 1900[8] Marconi substituted for the plain aerial an in hydrogen instead of in air or compressed gas as previously done. This modification is not, however, so efficient as the older methods and gives oscillations varying in amplitude and intensity and accompanied by strong harmonics,[7] but I have considered it worth mentioning on account of the amount of interest it appears to have excited in Europe.

Some very important and interesting papers on electrical oscillations were published during these years by Oberbeck,[8] Wien,[9] Drude,[10] and Bjerknes.[11]

In America the development of the sustained oscillation non-microphonic system has proceeded steadily and it may now be said to have reached the stage of commercial practicability. On account of the amount of work which has been done it would be impossible to refer to more than a few of the recent advances.

[1] U. S. patents 727,325, June 2, 1900, and 727,330, March 21, 1903.
[2] Lodge, Great Britain patent, 11,575, May 10, 1897.
[3] Marconi, Great Britain patent, 12,326, June 1, 1898.
[4] Official report U. S. Navy of test U. S. S. Massachusetts, Oct., 1899.
[5] Lodge, Muirhead and Robinson, Great Britain patent, 13,521, June 14, 1902.
[6] Brown and Neilson, Great Britain patent, 28,955, Dec. 17, 1896.
[7] A. Neugschwender, Wied. Ann. der Physik, 1899, val. 67, p. 430.
[8] Marconi, Great Britain, patent, 7,777, Apr. 26, 1900.

[1] Marconi, Great Britain, patent, 10,245, 1902.
[2] Fleming, Proceedings Royal Society, London, 1905, Vol. 74.
[3] Elster and Geitel, Wied. Ann der Physic, Vol. 52, page 433.
[4] Duddell, The Electrician, 1903, Vol. LI, page 902.
[5] Fleming, Proceedings of the International Congress, St. Louis, 1904, Vol. 3, page 603.
[6] Poulsen, U. S. patent, 789,449, June 19, 1903.
[7] Austin, Bulletin of the Bureau of Standards, Vol. 3, No. 2.
[8] Oberbeck, Wied. Ann. der Physik, Vol. 55, 1895.
[9] Wied. Ann. der Physik, Vol. 8, 1902.
[10] Drude Ann. der Physik, Vol. 13, 1904.
[11] Bjerknes, Ann. der Physik, Vol. 44, 1891, and Vol. 47, 1892.

The following are some of the later types of detectors:

The *frictional receiver*,[1] in which the waves produce a change of friction between two moving surfaces and so cause an indication.

The *heterodyne receiver*,[2] in which a local field of force actuated by a continuous source of high frequency oscillations interacts with a field produced by the received oscillations and creates beats of an audible frequency.

The so called *thermoelectric receivers* of Austin,[3] Pickard[4] and Dunwoody.[5]

The *"audion" of deForest*,[6] a very interesting and sensitive device, which though superficially resembling Professor Fleming's rectifier appears to act on an entirely different principle.

The *Cooper Hewitt mercury receiver*, about which little is known but which appears to be very sensitive.

The following are some of the later methods of producing sustained oscillations:

The *substitution of a number of arcs in series having terminals of large heat capacity* in place of the single arc in the arc method.[7]

The *use of regulating or "fly-wheel" circuits* in connection with the arc method.[8]

The *method of producing oscillations* shown in Figure B by using two arcs and throwing the discharge from one side to the other alternately at a frequency regulated by the constants of the electric circuit.[9]

The *condenser dynamo*[10] which consists of two radially slotted discs separated by a mica diaphragm, charged by a continuous current source of potential, and rotating in opposite directions.

Two-phase high frequency dynamo method.[11]

Commutator method.[12] In this method the high frequency is produced by means of a ball rotating at high speed on the interior surface of a commutator. Shown in Figure C.

The *helium arc method*[13] in which the arc is produced in helium or argon or similar gases.

[1] U. S. application, 251,538, March 22, 1905.
[2] U. S. application, 271,539, June 28, 1905.
[3] Austin, U. S. application, 319,241, May 29, 1906.
[4] Pickard, U. S. application, 342,465, Nov. 8, 1906.
[5] Dunwoody, patent, 837,616, March 23, 1906.
[6] deForest, U. S. patent, 836,070, Jan. 13, 1906.
[7] U. S. application, 291,737, Dec. 14, 1905.
[8] Ibid.
[9] Ibid.
[10] U. S. application, 291,739, Dec. 14, 1905.
[11] U. S. patent, 793,649, March 30, 1905.
[12] U. S. application, 316,521, May 12, 1906.
[13] U. S. application, 351,560, Jan. 7, 1907.

The *critical pressure method*[1] in which the electrodes extend within a certain critical distance, depending upon the pressure used, so that the discharge always passes at the same voltage irrespective of the distance between the electrodes.

Methods of Signaling. Continuous production of waves but changing constants of sending circuit.[2]

The *inverted method* of sending and the method of signaling by sending dots, the interpretation of which is determined by similar commutators at the sending and receiving stations.

Duplex and Multiplex Methods. A considerable number of these have been worked out, mostly operating either by balance methods[3] or commutators.[4] It is impossible to discuss all the various improvements, such for example as the method of indicating the busy and free state of a station, the methods of sending and receiving in one direction, the various types of aerials used for receiving the other components of the electromagnetic waves besides the electrostatic component, etc.

Figure L shows the harmonic interrupter for determining the variation of intensity with change of note.

Figure M shows a type of receiver described in U. S. Patent 706,747, in which the telephone diaphram is formed of thin copper and repelled by a fixed coil having a resistance of about 16 ohms. The principle of this receiver was discovered by Professor Elihu Thomson. It has been used for wireless telephony for a distance of 11 miles with fairly satisfactory results.

Figure N shows a transformer used in the transmitting circuit. The number of primary and secondary turns can be altered continuously, and also the degree of coupling. The wire is wound off from an insulating cylinder onto a cylinder of copper, and the cylinder of copper, forming a closed circuit secondary of the transformer, annuls the inductance of that portion of the wire wound upon the copper cylinder.

Figure O shows an apparatus for determining the best shape of coil for use with the heterodyne receiver.

Figure P shows a group-tuned call; that is, a vibration galvanometer which operates a selenium cell and rings a bell when a call is received.

[Mr. Fessenden's interesting paper will be continued in the September TELEPHONY.]

[1] U. S. application, 355,787, Feb. 4, 1907.
[2] U. S. patents, 706,747, Sept. 28, 1901; 706,742, June 6, 1902; 727,747, March 21, 1903.
[3] U. S. application, 366,528, April 5, 1907.
[4] U. S. patent, 793,652, April 6, 1905.

LEGAL IMPEDIMENTS TO CONSOLIDATION

An Interesting and Important Paper Read Before the Indiana Independent Telephone Convention

By M. L. Clawson

THE consolidation of the telephone interests of this state and of the several states is a very live matter at this time, not only from an economic or commercial standpoint, but from a legal standpoint as well, and, the committee on program having assigned to me a discussion of the legal questions involved, I leave the economic and commercial side to those more ably fitted to discuss the same and for the further reason that it has little or no bearing upon the cold propositions of law involved in a discussion of the question assigned. I take it that the subject to be discussed—although the national importance was meant to be of local application—is the consolidation of telephone companies or systems under the laws of the state of Indiana, and insofar as this is covered by statute or supreme court decisions, it will not have much bearing on the situation outside of the state. But if there is any doubt as to what the law is in the state of Indiana, then the question becomes one of general application to be deduced from the decisions of the several states and the statutes expounding the public policy of these states. The writer will undertake to define the law of the state of Indiana as it exists at present with reference to the consolidation of telephone companies or telephone systems, and the rights of telephone companies or systems to consolidate under the laws of other states will not be determined by this opinion except insofar as the laws or decisions of said state harmonize with the laws and decisions and public policy of the state of Indiana.

The consolidation may be of two kinds. First, consolidation by agreement; second, consolidation by force of law. In a sense, of course, consolidation by agreement is by force of law, but the first consolidation means that by agreement of the parties, irrespective of the law of the state. The second kind of consolidation, that by force of law, has reference only to that consolidation of telephone companies or connecting systems where such consolidation is made compulsory by statute. In other words, the

classification may be simplified as follows: First, voluntary consolidation; second, involuntary consolidation. The questions will be discussed in that order.

VOLUNTARY CONSOLIDATION.

In the case of Fisher vs. the Evansville and Crawfordsville Railway Company, 7 Indiana, 406, the Wabash Railroad Company and the Evansville and Illinois Railroad Company had consolidated their charters and the question of the authority of such companies came before the court for an opinion. In the charter of the Evansville and Illinois Railway Company the state reserved the right to permit other companies to connect with that road without specifying the character of the connection. The Wabash Railroad Company's charter contained a clause allowing consolidation. The court said: "These sections, we think, authorized the companies to consolidate so far as the state was concerned. In other words, they expressed the consent of the state to such an act. With the consent of the stockholders, therefore, it could take place."

It may be remarked that by act of legislature of March 4, 1853, the acts of the company in consolidating were legalized. You will notice in the first place that this was a consolidation of public utility corporations. You will notice in the second place that the right to consolidate was reserved in the charter of each of the companies, and that that reservation was a consent upon the part of the state. You will notice in the third place that the court takes the position that there could be no consolidation except by consent of the state. The net result of the Fisher case, then, is that where public utility corporations of this state have reserved the right in their charter to consolidate, such consolidation, if otherwise within the bounds of public policy, is valid. The next case was the case of McCrea vs. Junction Railroad Co., 9 Indiana, 358. In 1853 the Junction Railway consolidated with another railroad company for a road from Rushville to Indianapolis without the consent of one of the stockholders. By an act of the legislature in February, 1853, the state gave its consent to such consolidation. Thereupon the company sued the stockholder for his stock and he resisted payment on the ground of the consolidation above mentioned.

The court said: "As the state consented to the consolidation, the act of the companies in making it is not voided, but that act constituted so great a change in the companies committing it, bound them to so wide a departure from the original purpose of either company, that it furnished a cause for the discharge of stockholders not consenting to it. Nothing in the original charter of the Junction Railroad Company authorized so radical a change."

The court then referred to the Carlisle case in the 6th of Indiana, 316, and said in that case: "One road was made into two, but in this case, the Junction case, two roads were made into one."

A judgment was reversed with costs. On the 5th day of May, 1856, the foregoing opinion was delivered, reversing the judgment of the lower court. On the 21st of May the decision was set aside and the cause immediately submitted by agreement. The court said: "After the consolidation it is clearly not the same corporation to which the stockholders subscribed. Unless he in some way consented to it, he is clearly discharged. The relation between a railroad company and a stockholder is one of contract and any legislative enactment which, without his consent authorizes a material change in the powers or purposes of the corporation, not in aid of the original object, if acted upon by the corporation, is not binding upon him."

The judgment below, which was against the stockholder, was reversed. You will note in this that the state legislature gave its consent to the consolidation, and to that extent, therefore, the state was estopped from asserting any action against the company, but as against a stockholder such consolidation, even with state approval, was void unless the stockholder consented. In the case of the State vs. Bailey, 16 Indiana, 46, there was a quo warranto suit filed by the prosecuting attorney in the name of the state against certain persons who claimed to be a railroad corporation and assuming to act as such, without being organized according to law. The question of the consolidation of corporations came up in this case, and the court said, citing with approval a Pennsylvania supreme court report: "That such consolidation can take place with the consent of the legislature. That it amounts to a surrender of the old charters by the companies, the acceptance thereof by the legislature and the formation of a new corporation out of such portions of the old as enter into the new; but that those stockholders in the old who do not enter the new are entitled to withdraw their shares of the capital stock and may enjoin until they are secured to them."

You will note from this that it approves the doctrine of the two former cases, to-wit, that consolidation can only occur with legislative consent. But the Bailey case also advances the further argument that such consolidation wipes out the old companies and forms a new corporation. We can readily see that if this be true, then legislative consent is necessary, because a corporation cannot be formed except by statute. Therefore, if the consolidation of the two companies wipes out those companies, any resulting corporations would have to be borne by virtue of the statute of this state, because a corporation has no existence aside from statute. The law is the magic wand by virtue of which a corporation lives, moves and has its being. The next case was that of the Shelbyville Turnpike Company vs. Barnes, 42 Indiana, 498. The legislature had, in act of February 1859, authorized the consolidation of turnpike companies, but the act allowed only such consolidation as to companies "theretofore organized." The court said: "The only statute to which our attention has been called relating to the subject of consolidating such companies is that of February, 1859. This act only authorizes the consolidation of companies theretofore organized and cannot apply to the companies attempting to consolidate in this case which were organized, as we have seen, in 1869. We are not aware of any authority by which such consolidation can be sustained, where there is no statute authorizing it, and counsel for appellant has cited none. It has been several times decided by this court that a consolidation without the consent of the stockholder, even when recognized by statute, furnishes a cause for the discharge of the stockholders not consenting."

This case cites with approval the former cases already discussed by me and approves the doctrine that legislative consent is necessary to consolidation, and that even with legislative consent, such consolidation discharges the liability of a non-consenting stockholder. The next case brought before the supreme court for its decision was McMaham vs. Morrison, 16 Indiana, 172. This was a consolidation between the Cincinnati, Newcastle and Michigan Railroad Company with the Cincinnati, Logansport and Chicago Railway Company and the Cincinnati, Cambridge City and Chicago Short Line Railroad Company into a new corporation, styled the Cincinnati and Chicago Railroad Company. The court said: "As the legislature, by an act had given its consent to such consolidation, the effect of it under the acts and terms of the consolidation was a dissolution of the three corporations named, and, at the same extent, *the creation of a new corporation*, with property, liabilities and stockholders derived from those then passing out of existence."

Again is the doctrine of consolidation by legislative consent only upheld, and the statement that a new corporation is created by such consolidation. The same doctrine is upheld in the case of Hanna vs. Cincinnati Railway Company, 20 Indiana, 30, and also in the case of Railroad Co. vs. Jones, 29 Indiana, 465. In this last case there was a consolidation of two railroad companies, and the court said: "By the consolidation both of the old companies ceased to exist separately, and all their effects and franchises were invested in the new company. The two corporations became merged in one."

The cases are sustained by several subsequent cases in this state and the law in the state of Indiana today as to all corporations, both utility and private, is that there can be no consolidation unless that consolidation has received legislative approval. Consequently the legislature has provided that certain classes of corporations can be consolidated—voluntary associations, slack water navigation companies, street railroad companies, railroad companies, hydraulic companies, high schools and academies, gravel road and other companies, and bridge companies. In each and every instance there has been a statute passed allowing the consolidation upon the terms and conditions named in their respective statutes. What powers of consolidation, then, have telephone companies in the state of Indiana, in view of the decisions just quoted and the statutes referred to?

In the first place, public utility corporations have only the powers granted to them by their charters and such powers as necessarily flow from or are connected with the powers expressly given. And in construing statutes giving powers to public utility corporations, the interests of the public are the determining factors, and if there is any doubt, that doubt is resolved against the corporation and in favor of the public. Consequently, there are no statutes in this state by virtue of which a telephone company can claim the right to consolidate. Surely, there is nothing in the statute governing the consolidation of bridge companies. Neither can there be found anything in the hydraulic statute or the statute governing railroad companies, and I am quite sure that some of my friends in the telephone movement who are in favor of heavily watered stock would not seek the aid of the statute allowing slack water navigation companies to consolidate.

This being the case, we must answer the question: "What statutes are there in the state of Indiana allowing consolidation, and if there are any statutes allowing the consolidation entire, what statutes of merger or amalgamation can be found? The telephone statute in this state, Section 5517, Burns' Revised Statute, Vol. 2 of the Revision of 1901, allows the incorporation of a company for the purpose of establishing, maintaining and operating telephones and telephone exchanges, and after describing its officers, their duties, the by-laws that may be adopted, the sale of the corporation, it proceeds as follows, Section 5524: "Any telephone company organized under this act shall have power to lease or attach to other telephone lines or exchanges by lease or purchase."

This is the only provision in the Indiana statutes today concerning the right of one telephone company to consolidate with

another. The section just quoted falls far short of consolidation or even merger. Under this statute a telephone company has the right to lease other telephone lines or exchanges, or it has the right to attach its lines to other telephone lines or exchanges, but the leasing of a telephone line or a telephone exchange by another company falls far short of consolidation. The lessor company still is in existence, still maintains its business, still has its own office, its own office force, its own obligations, its own credits, and still maintains and operates its own business, whereas, if it became a part of the consolidated concern, the lessor company could be wiped out of existence, would have no management or control over its business, would and could not be sued as such, or bring suit as such, and would not be known in the eyes of the law.

It is a well settled doctrine that a public utility corporation cannot alienate the franchises it has to manage or control its lines, as this would result in the company being powerless to perform its public duties. For this reason, in the absence of legislative authority, it cannot, by lease or any other contract, turn over to another corporation its line and the use of its franchise, since a lease might have the same effect as the sale of property. (Jones on Telephone and Telegraph, Section 48.) "However, it has been held that a telegraph company could lease its lines and equipments for a reasonable length of time." (Western Union vs. Baltimore Ry. Co., 69 Maryland, 211.)

Where, however, the lease would amount practically to a sale, this cannot be done. (Section 48, Jones on Telephone and Telegraph.) Where a telegraph company has a public duty to perform and the same has been acquired by a legislative grant, it cannot dispose of the obligations so acquired in any manner without the consent of the granting power. (Note 31, Page 54, Jones on Telegraph and Telephone.)

Even where the legislature has given the right to a telegraph company to lease its line to another company, the grant does not necessarily carry with it the franchise of the corporation and thereby exempt the lessor from the responsibilities for which it has obligated itself. It is the duty of the parties to the contract of lease to abandon the contract after they learn the true status of their condition. (Armond vs. Columbia Railroad Co., 28 S. Carolina, 401. 38 American State Reports, 686.

These last two cases clearly show that where a legislature gives the public utility corporations the power to lease its lines to another company, the grant does not carry with it the franchise. Consequently, the power to lease is not the power to consolidate, for the consolidation carries with it the franchise. The power to consolidate is the power to surrender the franchise you have in return for a new one; the new one to be the consolidated franchise. Again, it is unquestionably the law that the legislature may, by express terms, authorize a telegraph or a telephone company to alienate its franchise. (Michigan Telephone Company vs. St. Joseph, 121 Michigan, 502. 47 L. R. A., 87.)

But even in these cases it is stated that it must be done by express grant or by reasonable implications. Where the right to alienate has been given by the state, a lease of such franchise may be implied from such right. The contrary, however, would not be true that where the power to lease is given, the power to alienate is not given. In construing statutes we must always look to the intent of the legislature. The intent of the legislature in allowing consolidation of different corporations in this state is the largest factor in determining what the rights of the subject companies are. We only have to look to the different consolidation statutes in this state to become convinced that there is no power of consolidation in the telephone statute in this state.

For instance, Section 5468 says: "That whenever two or more street railway companies desire to consolidated, they may, by resolution of their respective boards, make such consolidation." In a later clause of the same statute the express power to lease the road, equipment and plant of another street railway is given, and thus we see that the statute expressly uses the word consolidation, expressly discusses consolidation and states the methods by which such result is obtained, and in addition to allowing such consolidation by express grant, it adds a section to the statute, stating in what way the street railway company may lease the lines of another company. So also in the statute of this state, allowing the consolidation of railway companies, it is expressly set out the steps necessary to form the consolidated company, mentions the consolidation expressly, defines the rights and duties of the newly created company, and defines the terms and conditions under which the newly created corporation will be allowed to carry on its business.

The writer is of the opinion that the absence of such express grant in the telephone statute, the absence of any steps to be taken upon the part of telephone companies, the failure to lay down the terms and conditions of consolidation, the failure to mention the word, bearing in mind that the statute must be strictly construed against the telephone company, forces one to the conclusion that the power to lease a telephone line or exchange, that the power to purchase a telephone line or exchange, that the power to attach to the lines or exchange of another telephone company is not the power to consolidate with, to swallow up or to merge with a rival telephone company. The exact statute has never been construed by the supreme court of this state, and therefore, although the writer feels it falls far short of a consolidation statute and can be by no reasonable intendment made to cover a consolidation of telephone companies, we are forced to examine the decisions of other states in order to determine just what rights of consolidation do exist upon this statute, if they exist at all.

As the effect of the consolidation of two or more companies is to create an entirely new and definite corporation, and as the consent of the state is necessary in all cases to the creation of a corporation, it follows therefore, that there can be no valid consolidation of two or more corporations without the consent of the state expressed in some manner, to which the state gives the effect of a law in this state only in a general enabling act of the legislature. We also run against another proposition of law, equally well settled. That in order that there be a valid consolidation between two corporations, the power so to consolidate must have been conferred upon each of the constituent corporations by the state, under whose laws it exists.

For example, if one corporation has reserved in its charter the power to consolidate with another, this power does not give it the right to consolidate with a company whose charter contains no such provisions. (10 CYC 290.) The writer believes that almost without exception there is no power to consolidate reserved in the charters of the telephone companies of this state and therefore there can be no consolidation by such telephone companies without such reserved power.

If the power is not reserved, it can only be conferred in one way and that is, by a statute of the state of Indiana. If the law is silent there is no consolidation and in order to consolidate, the law must not only speak, but speak in unequivocal language, especially if the consolidation be between corporations engaged in furnishing a public service. (10 CYC 290 and 291.)

This brings us down to the proposition that the state may impose the terms and conditions of consolidation. If the companies should, otherwise being eligible to consolidate, desire to accept that state's terms and conditions, they will be obliged to comply with them thereafter. If they do not comply with such terms and conditions they may not consolidate. (10 CYC 290.)

The purchase by one corporation of a majority of the stock of another, thereby securing the control of the latter, constitutes a consolidation. (Einstein vs. Rochester Gas Co., 77 Hon. N. Y. 149.)

The decisions of our country have even gone so far as to hold that the state may withdraw its statutory power to consolidate before the consolidation has been effected. This, of course, is only where the power to consolidate has been conferred by statute after the granting of the charter. (10 CYC 291.) And even where parallel and competing steam railroad companies possess under their charters the power to consolidate, the state may, in the exercise of its police power prevent such a consolidation at any time before it has actually taken place, by a constitutional amendment or a statute prohibiting the consolidation of parallel and competing lines. This was decided by a case, which in the opinion of the writer is destined to become a leading case in this country upon the question of the necessity of competition in public utility service. (Pearsall vs. Great Northern Railroad Company, 161 U. S. 646.)

In all these statutes in the different states, providing for the consolidation of corporations, however, we frequently find express prohibitions against the consolidation of parallel and competing railway lines. Take for instance the statutes of New York. Some states have gone so far in this direction as to place such a prohibition in their constitution. Among these states may be named, Arkansas, Florida, Missouri and New York. On the principle that grants of franchises to corporations or to individuals are to be strictly construed in favor of the state and against the grantee, it is held that neither the power of competing railroad companies to consolidate nor the power of one of such roads to acquire the other by purchase is conferred by a collection of statutes authorizing railroad companies to purchase and acquire branch roads, although one of such statutes contained the words: "And may purchase and hold any road constructed by any company." This was decided in the case of Louisville Railway Company vs. Kentucky, 161 U. S. 677.

The language in the Kentucky railroad statute was broader than the purchase clause in the telephone statute in this state and yet the supreme court of the United States held that it did not confer a power of consolidaion and neither did it confer the power to purchase a competitive line. These statutory prohibitions and constitutional amendments concerning the consolidation of parallel or competing railway lines cannot be effected through the form of a judicial sale of one of such roads. This was decided in the Louisville case just referred to. Indeed the power of the state to forbid transportation companies from consolidating with parallel or competing lines has been before the courts in a large number of cases, in some of which, relating to interstate railways, it is said by way of argument that such statutes infringe the exclusive power of congress over state commerce. And finally it has been held by the

only court whose decision can settle that question, that the power to prohibit the consolidation of parallel and competing lines of railway is within the police power of the state and that this power may be exercised within wide limits of legislative discretion whenever its exercise will not trench upon rights already vested, and further, that although the power to consolidate may have been distinctly conferred, it may be withdrawn if not acted upon at the will of the legislature and this, although there exists at the time no reserve of power in the state to alter, amend or repeal charters or acts of incorporation. (10 CYC 292.)

The power to unite or connect with another road as conferred by statute, refers merely to a physical connection of the tracks and does not authorize the purchase or even a lease of such other road or any union of the franchise of the two companies. (Note 23 10 CYC 293.)

There is yet another limitation upon the power of a corporation to consolidate where that power is conferred by statute. A domestic corporation cannot consolidate with a foreign corporation unless the power to consolidate is distinctly conferred by statute and if the statute is doubtful or ambiguous, the doubt must be resolved to be against the existence of the power. (American Co. vs. Minn. Railway Co., 157 Ill. 641; 42 Northeastern 153.)

And this consolidation between a domestic corporation and a foreign corporation cannot be effected unless there is a power to consolidate conferred upon each of the constituent corporations. (Note 29, 10 CYC 293.) And where the consolidation is attempted without such authority, the corporation is not recognized even as de facto. We are therefore of the opinion that unless there is a statute in this state expressly conferring the rights of consolidation upon telephone companies, that no right of consolidation exists. We also hold that if the statute which it is claimed confers such power is ambiguous or doubtful in its meaning, that the doubt must be reserved in favor of the public and against the corporation.

Under these principles of law we hold that the telephone statutes of this state do not confer consolidation upon a telephone corporation doing business in this state and that unless the telephone companies have reserved the right in their charter to consolidate, they cannot consolidate in the absence of a consolidation statute. We also hold that the word "lease" and the word "purchase" do not confer the power of consolidation.

Consolidation means the elimination of competition. The elimination of competition means monopoly. Our statute has wisely kept as one of the elements of sound public policy, active and healthy competition. This is the reason and the only reason, as the writer understands it, that the power to consolidate has been withheld from public service corporations. As to the first subdivision of our subject, voluntary consolidation, then we hold that there is no such thing in the state of Indiana in so far as telephone companies are concerned, except the charters of the companies to the consolidation contain that power.

INVOLUNTARY CONSOLIDATION.

There is no statute in this state upon the question of involuntary consolidation. The question has been much discussed but with no practical results. Several of the states, for instance Montana, have a constitutional provision compelling, not consolidation perhaps, but accomplishing the same result so far as the public is concerned, by making it mandatory upon telephone companies operating within that state to interchange business upon terms to be agreed upon or upon failure to agree, to abide by such reasonable terms as a commission may determine. This also is true in the state of Kentucky. In the constitution of that state it is provided that telephone companies operating exchanges shall receive and transmit the other's messages without unreasonable delay or discrimination. This, of course, is not a consolidation of the several telephone companies but the result is the same as it accomplishes and furnishes to the public consolidated telephone service and in effect is involuntary consolidation for the public is interested largely in the service which is capable of being rendered for them and interested incidentally only in the profits that might accrue to the stockholders of the company who are compelled to render such interchangeable service.

There being no statute in this state upon involuntary consolidation of telephone companies or other quasi public utility corporations, we are compelled to seek the decisions of other states in order to determine what rights, if any, the legislature of this state would have in forcing such consolidation. It has been held as regards quasi public corporations that the legislature may authorize a consolidation without the unanimous consent of the stockholders where provisions is made for compensation to dissenting stockholders for the value of their stock. This decision was decided upon the ground that stock in a corporation was subject to the power of eminent domain. (Black vs. Delaware Canal Co., 24 N. J. Equity 255.)

It has, however, been held that equity will enjoin a consolidation, unauthorized, for want of unanimous consent of the stockholders, at the expense of a single dissenting stockholder. (Blachford vs. Ross, 54 Barbour 42; Charleston vs. Newcastle Railroad Co., 5 Jur. N. S. 1096; Botts vs. Simpsonville, 88 Ky. 54; 80 Maryland 278; Mowrey vs. Indianapolis, etc., Railway Company, 4 Biss. N. S. 78; 18 N. J. Equity 17; 29 Ver. 545; 129 N. Y. 57.)

It has been held, though contrary to the great weight of authority, that where the amount of dissenting stock is considerable in comparison with the stock of stock owners who have acquiesced in the consolidation, equity may refuse an injunction and merely require security to be given for the payment to the dissenting stockholders of the value of their stock. (McVicar vs. Ross, 55 Barbour, N. Y. 247).

"If the legislature has no power to force a consolidation when all but one of the stockholders consent, pray tell me where comes the power to force an arbitrary statutory term of consolidation when all object?"

In the case of public service corporations where the legislature retains the power to alter or amend the charter of a corporation, it may authorize a consolidation without the unanimous consent of the stockholders. But how can it if the power to amend is not reserved? In the case of Botts vs. Simpsonville, 88 Ky. 54, it was held that the legislature under the power to amend the charter could not authorize a consolidation without the unanimous consent of the stockholders where it affects the rights of the stockholders by increasing their liabilities or diminishing the value of their stock. "It is well settled upon the principles of the common law in this state and most of the states in the Union, that when a number of persons become members of a corporation for definite objects specified in their charter, which in such case is their contract, and for a time settled by it, that the objects and business of the corporation cannot be changed or abandoned or sold out within the time specified without the consent of all the partners or corporators. One partner or corporator, however small his interest, can prevent it and this is so although by law a majority in either case can control or manage the business against the will and interest of the minority so long as it is within the scope of the charter."

This rule is founded on the great principle of protecting every man and his property by contracts entered in to. (Zabriskie vs. Hagensack, 18 N. Y. Equity 178.)

The statutes authorizing consolidation generally prescribe the manner in which the consolidation should be effected and in such a case, as in a case of original incorporation, the essential requisites *must be strictly complied with and especially where the validity of the consolidation is attacked in quo warranto proceedings or other remedies* adopted by dissenting stockholders. Does it not follow logically that this would not be true if the state could force consolidations?

The statutes in most of the states and in some instance the constitution of the several states contains provisions prohibiting consolidation of competing public service corporations. This is almost universally true of the several states of this Union. The public policy of the several states are expressed either in organic or statutory law and these organic clauses and statutory provisions are founded upon the old common law theory of competition and prevention of monopoly. This feature of public policy is as well grounded, as deeply rooted in our system of legislation, as liberty itself. It is of just as long standing as the charter rights. It is just as firmly founded as the right of free speech. It is absolutely as necessary as the right of private property.

Without competition, with monopoly, there can be no such thing as individual proprietorship. Individual ownership, communism or socialism cannot exist in the same place.

If power upon the part of the state is given to compel the consolidation of competitive public utility corporations, then the state can force the sale of public utility corporations to the government. If the government can compel one corporation to sell to another, it can compel the sale of both corporations to itself. If it can compel the sale of two such corporations to itself, it can in logic and upon principle compel the sale of all corporations to the government without constitutional change or alteration. That this cannot be done within constitutional limitations is obvious by the very speaking thereof.

It is very true that we have handed down from the old common law the principle that whatever is subject to a public interest is subject to public use but not public abuse. It is also admitted that the principles of law laid down in the case of Munn vs. Illinois, are correct principles of constitutional law, but the power to regulate corporations or public utility functions, the power to prevent discrimination in their conduct, the power to control their business within reasonable limits under their charters, is one principle and this principle is founded upon the correlative theory that the business of the corporation aside from such regulation, is to be and remain with the corporation; that the title of the corporation is to be in the corporation under the guidance of the directors and managers elected by the stockholders and owners of the corporation.

A contract launching a corporation upon the commercial sea is just as valid and binding upon the government and upon the legislature as it is upon the stockholder. By the charter the stockholder requires title to his stock. By the charter the stockholder requires an interest in the assets of the corporation but the state cannot, if these facts be true, have to itself reserved the power to shift the title at pleasure to depreciate or enhance the value of stock at the caprice of the legislature or to force a corporation, who has invested millions of dollars and whose stock is gilt edged in the

markets of the country, to consolidate with an insolvent rival, to merge its holdings vast in number and value, with the watered stock of a competitor whose game has been hopelessly lost in the commercial and industrial world and the enhanced value of whose stock is due only to such compulsory consolidation.

All that is necessary would be to incorporate a fictitious railroad company parallel to a valuable railroad property, then fly to the sheltering wings of a compulsory consolidation statute in order to boost the value of the company's stocks or bonds. There might be one commendable result. It would obviate the necessity of watering stock, and that doctrine would at once give away to the improved method of consolidating stock.

The supreme court of our state has never passed upon the question of compulsory consolidation. The supreme court of the United States has never had this matter brought to its attention but until the theory of our competitive system is wiped from our legislative and constitutional provisions, until the whole theory of our common law as it existed in times past, and as it exists by decisions to-day, is changed, compulsory consolidation can and will not be sustained by the courts of this country.

By the anti-trust law of our state, by the constitution of our state, by the federal anti-trust law, by the interstate commerce commission and the statute under which it acts, and by the federal constitution, competition between public utility corporations is a part of our laws and public policy and no state legislature can within constitutional bounds compel public utility corporations to consolidate in the sense and within the meaning the courts have given to that word. In the Pearsall case it is stated that "the people in their sovereign capacity or the legislature as their representatives, may deal with the charter of a railway corporation so far as is necessary for the protection of the lives, health and safety of its passengers or the public or for the security of property or the preservation of the public interests, provided of course, that no vested rights are thereby impaired."

In other words, the legislature may not destroy vested rights, whether they are expressly prohibited from doing so or not. As applied to railroad corporations it may reasonably be contended that term, vested rights, extends to all rights of property applied by executed contracts as well as all such rights as are necessary to the full and completel enjoyment of the original grant of property legally acquired subsequent to such grant.

If, for example, the legislature should authorize the construction of a certain railroad and by a subsequent act should take away the powers to raise funds for the construction of the road in the usual manner by a mortgage, or the power to purchase stock or equipment, such acts perhaps might be treated as so far destructive of the original grant as to render it valueless although there might in another case, be an express repeal of any of the provisions of the charter."

In the Pearsall case the law is correctly laid down that unless the power to alter the charters of the corporation is reserved, it is probable that a prohibition against the voluntary consolidation of competing corporations will not effect contracts and rights already acquired under a power to consolidate. (Pearsall vs. Great Northern Railroad Company, 161 U. S. 646.)

So that the doctrine that the state cannot wipe out a contract and has no right to compel the course of business of a corporation with reference to that contract, is admitted even in cases where voluntary consolidation has been effected. If the state is powerless in that instance with much less reason can it be said that the state has the power to act where the course of the corporate business is radically changed, the title to the corporate property wiped out, the interest of warring and diverging stockholders blended and forced into opposition without their consent and against their will, and the investment value of millions of dollars changed by the caprice of the legislative assembly.

Involuntary consolidation cannot be considered by the wildest flights of imagination as being within the police power of the state. The state is given no such power in the Indiana constitution. The state reserved no such powers in the consolidation of the telephone companies of this state and there has been no statute reserving the right to such state passed by the legislative assembly of this commonwealth at any time during the creation of the numerous telephone companies in this state.

It has even been held that the remedies for the enforcement of a contract existing in a state when the contract is made was a part of its obligation and no repeal or subsequent change of these remedies which substantially obstruct or retard their enforcement or lessens the value of the agreement, impairs its obligation and is unconstitutional and void. (Harrison vs. Remington Paper Company, 140 Fed. 385; Myers vs. Knickerbocker Trust Co., 105 Fed. 111.)

In a late case, the Pittsburg-Alleghany Consolidation Case, it was decided that:

"The powers, rights, charters, franchises and privileges held by a municipal corporation is held at the will of the legislature. The legislature has complete control over the property of the municipality and even over its rights and obligations.

"The property of a city is of two kinds. There is a well recognized distinction between property owned by it in its governmental capacity, as an administrative agent of the state, and that owned in its proprietary capacity for private benefit for its own use. The legislature has not the same broad powers of control over the latter. The corporation in respect to it stands in the same position as a private corporation or an individual and is protected in the same way." (24 N. J. Law 385; Patterson vs. Society; Cemetery vs. Boston, 158 Mass. 509; Detroit vs. Detroit Road Co., 43 Mich. 140.)

But while the legislature can alter or destroy its municipal corporations at will, yet if the corporation has entered into a contract, as for example, issued bonds or incurred any indebtedness, legislature cannot be used to defeat contracts already entered into.

With this limitation it would appear that the legislature has almost unlimited power under the federal constitution over municipal corporations. If the state cannot compel consolidation of municipal corporations when rights have vested, whence does it derive its power to compel public utility corporations to consolidate? (Hunter vs. Pittsburg, 28 Supreme Court Reports, Page 40; In re Penn. Tel. Co., 48 N. J. Equity 91; 20 Atlantic 846.)

In all of our investigations we have found by very few cases, the argument of which can be used with any degree of legal certainty in determining the question of involuntary consolidation, but we have in mind one case known as the Chicago Lake Front case, officially entitled the Illinois Railway Company vs. Illinois, 146 U. S. 387.

In this case the railway company sought to obtain title to lands along the tide waters of Lake Michigan. The court held that the title which the State of Illinois held to such lands bordering on Lake Michigan and a part of it lying within the state limits is different in character from the title of the state to lands intended for sale. They held that it was a title in trust for the people of the state, that they may enjoy the navigation of the waters, carry on commerce over them, have liberty of fishing therein, free from obstruction and interference from private parties, and it is not within the legislative power of the state to change this purpose by a grant whereby it surrendered its property and general control over the land of an entire harbor, bay, sea or lake, though it may grant parcels thereof for wharves, piers, docks and other structures in aid of commerce, or parcels, which being occupied, do not substantially impair the public interests in the waters remaining.

There was no express provision in the Illinois constitution that such lands were held in trust for the people of that great state but the supreme court wisely held that it was one of the implied clauses of the constitution; that even the legislature did not have the right to bargain away a popular trust. In the same way it has been held that the legislature cannot by an act deprive the community of what is known as home rule.

Though there is nothing in the constitution expressly reserving this power unto the different communities, yet by the very nature of our institutions and the history of our constitutional growth, the courts have held and wisely held, that all legislative attempts to destroy this principle so firmly grounded in American life is invalid and unconstitutional. In this state the doctrine of home rule is recognized by several of our supreme court decisions. In the case of State vs. Denny, 118 Indiana 457, the court said: "The people still retain all power except that expressly delegated to the several departments of the state government and one of the inherent powers of the people is the right of local self government. In all the changes of policy, of dynasty, of peace and war and conquest, these organizations, to wit, municipal corporations have never been abated or abandoned. They are substantially at this time what they were before the Norman invasion. Wherever the Anglo Saxon race have gone, wherever they have carried their language and their laws, these communities each with a local administration of its own selection, have gone with them. It is here that they have acquired the habits of obedience to law. These are the nurseries of public spirit. They are the opposites of those systems which collect all power at a common center, wielded by a common will to effect a given purpose. The right of self government lies at the foundation of our institutions. It is a sacred fundamental principle, sacredly guarded and this right still enjoyed by the people unless expressly yielded up and granted to one of the departments of the state government by the constitution."

And the court decided that the people had not granted in their constitution to the legislature the power to deal with this question.

We can, with just as much truth, say that the principle of individual proprietorship of property, which necessarily involves competition, is as long standing as government. That it has been known in our jurisprudence ever since the Anglo-Saxon race battled for liberty. That it was deeply rooted in English history and imbedded in English law before the Norman invasion and that wherever the Anglo-Saxon race went, there went with it the competitive principle of industry. The competitive principle landed at Plymouth Rock. It sailed the seas to Jamestown. It followed the pioneers in the northwest. It hovered over the fur trade where rolls the Oregon. It invaded the Arctic circle. It thrives with the orange groves in Florida.

It is just as much a part of our government, our institutions and our civilization as the flag, popular government or the right of free

speech or the other cardinal doctrine that no man can be tried twice for the same offense. If these provisions can be altered at will by legislative enactment, then also can the principle of competition in the commercial and industrial field be destroyed, but so long as the constitution lives for the purpose of protecting the people, so long as individual proprietorship shall prevail against socialism, so long will involuntary consolidation of corporations be contrary to the organic law of our land. If the government can compel involuntary consolidation of public utility corporations as between themselves, if it can compel the sale or purchase of such a corporation, if it can dictate the terms of sale, it can dictate the vendee; it can make itself the vendee. It could consolidate all the corporations of government into one huge combination. We would have state socialism made over night.

Socialism and our constitutional government as it exists to-day, are diametrically opposite and they cannot be brought together under present constitutional provisions. In a late case coming from the Carolinas, the federal court held that the state could be restrained from enforcing a rate law in the state of South Carolina. I ask in all candor if it is unconstitutional for the legislature of a state to compel a railway to sell a mileage ticket at a price which would be ruinous to the railway investment? Wherein does the state have the power to compel a stockholder of that railway to part with his holding at a rate which is not agreeable with him, to which he has not given his consent, against which he has protested?

If the state cannot compel a railway to sell a ticket at the legislative price wherein does the state secure the grant of power to compel the railway to sell its stock certificates at a legislative price? It has been held time and again that the legislature has the power to determine within the constitutional limits, the rate of taxation and under the guise of taxation frequently legislatures have attempted to confiscate property and business and this has been held invalid, the courts saying that although public policy is an unruly horse, yet he must be well bridled and well harnessed; that they will not allow a legislature under the guise of taxation to work confiscation.

The power to regulate public utility corporations is not the power to destroy public utility corporations. The power to regulate presupposes the continued existence of the thing regulated. The power to destroy pre-supposes its immediate death. The constitutional power to tax presupposes the continued existence of the thing taxed. The power to destroy or confiscate presupposes its immediate death.

A franchise is an entity, as has been well said. There are two kinds of franchises and it is necessary to have a clear understanding of each in order to be able to distinguish between the two and see why one is alienable and the other is not. There is a primary franchise and a secondary franchise. The primary franchise is the right of being or existing as a corporation. It is a right granted by the legislature to act as a natural person without incurring individual liability. The secondary franchise is the right to contract, operate and maintain a corporation. The one is the right to be a corporation. The other is the right to carry on and operate the corporation.

The second connot exist until the first has been vested in the corporators. This cannot be alienated by the corporation itself. It is a personal trust. (Jones on Telegraph and Telephone, Pages 49 and 50.)

The primary franchise is the personal trust reposed in the corporation by the state to carry on and perform functions necessary to public existence. The grant of these powers to public utility corporations already in existence is a contract between it and the state and a contract involving the wants and the desires of the absolute needs of the public, of the state and of the nation. If it is a personal trust the legislature cannot bargain away these rights to any consolidated company on account of the very reasons which brought this corporation into existence, the needs and desires of the public.

It has always been held that the police power is an inalienable attribute of sovereignty and cannot be diminished. That no legislature can surrender or sell it or destroy or hinder power of its successors to make such enactments as they may deem proper in matters of public policy. From this it follows that if an irrevocable grant of franchise or any contract made by the legislature with an individual or corporation, specifies or implies a relinquishment of the police power of the state, it is to that extent invalid, the legislature having exceeded the authority delegated to it by the people.

In other words the exercise by the state at any time of its right to legislate for the protection and good government of the community, can never be construed into a violation of the prohibition in question, notwithstanding what its effect may be to repeal existing charters or otherwise invade the terms of legislative engagements. (Black on Constitutional Law, Second Edition, Page 337; Stone vs. Mississippi, 101 U. S. 814; Boyd vs. Alabama, 94 U. S. 645; 111 U. S. 746; Kresserm vs. Lyman, 74 Fed. 765.)

Even though the police power, as plenary and comprehensive as it is in the definitions furnished by a vast number of supreme court decisions, even this power cannot be used by the legislature without hindrance. The legislature itself, cannot under the guise of police regulation enact laws which violate the organic law. The police power itself does not embrace the general field of legislation but is restricted to matters which are properly of police regulation. When in the discussion of constitutional questions, its meaning is limited to making the laws which are necessary for the preservation of state itself, for the public health, the public morals and the protection of the state in the enjoyment of their just rights against fraud and operation.

Some laws are clearly within that scope. Others are somewhat doubtful. Black on Constitutional Law, 338, says it is much better not to stretch the term to its widest limits. For the police power, properly so-called, is so far reaching in its importance and so paramount in its sway, even as against guaranteed private rights, that its enlargement by continual loose applications of the term in cases where it is neither needed or appropriate is dangerous to the safeguards of freedom.

Under the American system of government, the police power is in the legislature of the several states of a plenary degree, subject only to the paramount authority of positive constitutional prohibitions. (Black on Constitutional Law 338.)

If the contract in a franchise means anything at all it means existence and if the police power is broad enough to force consolidation, it terminated the existence of the corporation it guaranteed life to.. This certainly cannot be done by the police power under the constitution of this or any other state. For instance, the country is a network of steam railways. Under the police regulations adopted by states and cities you may regulate the speed of trains passing through towns. Cities require them to build highways and crossings, maintain bridges, afford certain facilities to the public, require ringing of bells and the use of steam and slowing down at certain points. All these are regulations and pre-suppose continued existence of the things regulated, but does any one contend that the state would have the right to decree the termination of a railway corporation within ten years, when its charter contemplated twenty years and the corporation had violated no positive statute? The state can regulate any public utility corporation. It not only has the right to do so, but it should be the pleasant duty of the legislative department of the government to see that it is done.

One of the sad commentaries upon our present political situation to-day is the fact that our law making bodies have neither the heart, the brains nor the backbone to use the police power and regulate corporations to perform public utility functions as they should be regulated, as they should be controlled and handled, for the best interests of all in our commonwealth. If this power of regulation is only one phase of the police power, if this regulation extends to the death of the matter or subject regulated, if it means confiscation and extermination, then it means absolute control in every possible way over the thing or matter regulated or controlled. If that be the case, the state cannot only enforce consolidation between constituent companies but could merge all corporations in one and force that corporation to sell to the state or to transfer its title to the state without limitation and without purchase.

This indeed would be a government without constitutional limitations. A government which would end in socialism, communism or anarchy. That the state cannot go this far, while not determined by express decision, it is clearly understood from some very well reasoned cases, among which is found, in re Langford, 57 Fed. 570; McCullough vs. Brown, 41 S. C. 220; 42 S. C. 222. The police power of a state to regulate a business does not include power to engage in carrying on that business.

In conclusion we desire to summarize as follows: Voluntary consolidation can only be by constitutional or legislative consent and that only when expressly given or arises by necessary implication of powers already conferred. If by legislative enactment after the corporation has come in to existence it must be expressly or clearly understood from the powers granted and the right must be executed or the grant of power may be withdrawn. There is no reserve power extended to telephone companies in this state in their charters. There is no statute of voluntary consolidation in this state. The act commonly known as the telephone act does not comprehend the act of consolidation.

Involuntary consolidation is, first, opposed to public policy and unconstitutional under our present constitution of the state.

It is also in direct conflict with the public policy of the Federal government as expressed both in statutory and organic law. It is the taking of property without due process of law and a denial of the equal protection of the laws. It means state socialism and the elimination of private property and this is invalid so long as the private property clause is in our national constitution.

The state has no more right to carry on a monopoly itself of this character than it does to create one. That it cannot wipe out competition and create a monopoly to the detriment of the public, is well established. Involuntary consolidation means absolute confiscation. Confiscation is unconstitutional except in times of war and the most dire emergency, and such conditions do not exist today. Healthy competition in the telephone business is just as necessary to good service and good government as healthy circulation of blood in the body.

A Fight With an Octopus

By Paul Latzke

The Story of the Bell Company's Rise to a Power that was second only to that of the Standard Oil Company—The Betrayal of Friends and Associates, The Sacrifice of Great National Characters and the Desperate Purpose of a Fight that was Carried Straight into the White House.

A FOREWORD.

[This story should appeal especially to those who have good, red American blood in their veins. It is the story of a magnificent fight that was won against overwhelming odds. It is the story of a smug coterie of "Boston gentlemen" of the immaculate type, put to flight by a few sturdy men out of the west. It is the story of a low, scheming campaign of greed, that was turned into a rout by a fine, sentimental, American citizenship. It is a story full of dramatic interest, not because of the manner of telling, which is simple and commonplace enough, but because of the facts it relates.

It is the story of at least one trust that was "busted." It is a story that, while dealing with the details of an industrial war, will interest even the women, for it is full of good, clean, honest fighting, of the deeds of men who stood shoulder to shoulder under the Stars and Stripes, and, in the name of American freedom and independence, lined up against the most complete and relentless and successful monopoly of the times—and beat it to a pulp. It is a poor sort either of man or woman who cannot find somewhere in the record of these fighters the story of a deed that will stir the pulse.—THE AUTHOR.]

CHAPTER XVII.

UP TO THE PRESIDENT.

IT WAS to combat Payne that the Independents brought the telephone fight into the White House, during McKinley's administration, and again during Roosevelt's first term. They had become much alarmed over the growing influence of the Wisconsin man in national politics; and when, after McKinley's election, it was formally given out that Payne was slated for a cabinet position, the telephone men were in a panic. Several consultations were held at Chicago, and out of these grew a movement to fight Mr. Payne's appointment. The Independents had, at this time, no strong central organization, nor much money; but they had already a considerable popular following in the middle west. And they had a very aggressive leader in the person of James E. Keelyn, who had developed a large business as a manufacturer of apparatus. All hands lined up solidly behind the protest against Payne. It was pointed out that, if the gentleman from Wisconsin was appointed as head of either one of the two departments for which the public reported him slated—postmaster-general or secretary of the interior—he would be in a position to inflict serious damage upon the Independent cause. As postmaster-general he would have control over the placing of an enormous amount of telephone service. As secretary of the interior he would have control over the patent office, and what this meant had already been demonstrated by the Bell's alleged manipulation of that office in times past.

President McKinley was placed in a most awkward position by this complication, for Mr. Payne had the solid backing of practically all the big powers in politics. Next to Mark Hanna himself, no one had worked so hard to secure the President's election. Nor was the political backing alone in its demand for Payne's reward. The great financial power which the Bell has always managed to control was no less insistent in pushing the claims of the Wisconsin man. But, in the end, this combined influence, great as it was, proved futile. Mr. McKinley, as ever, listened to the popular voice, and Mr. Payne was "turned down." The Independents were jubilant. They had finally been revenged for all the difficulties that Payne had put in their way, and, more important than this, had overcome what they believed to be a serious menace to their business. That they did not exaggerate this menace was made clear enough by subsequent events, when Mr. Payne triumphed in his turn and landed the coveted cabinet position after Mr. McKinley had passed away.

It so happened that, when Mr. Payne made his second campaign for the cabinet, the Independents, though much more numerous, were not as alert. Their central organization, for a year or two preceding, had rather drifted, and the individual operators were so busy meeting demands for enlargements that they gave little or no attention to politics or to political conditions that might influence their affairs. Therefore, no concerted action was taken, as before, to prevent Mr. Payne's appointment, though the newspapers published the fact broadcast that Mr. Roosevelt had practically selected him.

A few individuals in the industry sounded a warning, but no attention was paid to them. It was not long after Mr. Payne's appointment that the Independents found what their lack of vigilance had cost them. An innocent order was issued by the postmaster-general, one day, instructing postmasters throughout the country that only one telephone system must thereafter be installed in postoffices, and that this system must be one that had long-distance connections that would enable the postmaster to communicate with Washington. This meant, of course, that all telephones except those controlled by the Bell must be thrown out. Immediately there was clamor and uproar. The various state, county, and district organizations of Independents got together to adopt defensive measures. Their situation was admirably summed up by a set of resolutions adopted by the Iowa state association. These resolutions pointed out that, as the Bell company was the only one permitted in the District of Columbia, it was impossible for any Independent company to have long-distance connection with Washington.

"Therefore," the convention declared, "this order of the postmaster-general is obviously issued in the interest of the Bell Telephone Company, this fact being made all the more

evident owing to his long connection with the Bell company, both as an official and stockholder."

The association also pointed out the injustice of this order to the people, because "subscribers of the Independent telephone companies outnumber those of the Bell company by more than 600,000." It was shown that, in hundreds of towns in Iowa, where there were none but Independent exchanges, the people would, under this rule, be cut off entirely from the postoffice.

Following the lead of Iowa many of the other state organizations took the matter up, and representatives were sent to Washington to enter a protest with the postmaster-general. One of those representatives, A. L. Tetu, then general manager of the Home Telephone Company, of Louisville, Kentucky, reported to a convention of the national association, at Chicago, a most interesting and sensational interview he had had with Mr. Payne. It is worth while quoting Mr. Tetu's statement to the convention, *verbatim*, as follows:

"I went to Washington because of the failure of the department to recognize a recommendation sent in by the postmaster at Louisville voicing his desire to retain the service of the Independent company. After first approaching the subject and referring to the recommendation of the postmaster, Postmaster-General Payne sarcastically remarked: 'Oh, well, I suppose this representation was brought about because the postmaster there is a stockholder in your company.' I said: 'Mr. Payne, I am not in a position to say whether he is or not. I do know, if he is, he has as much authority to be a stockholder in our company as you have to be a stockholder in the Wisconsin Bell Telephone Company.' I said, further: 'I propose to take this matter before the president. I will get it there some way or other, and I want him to consider the fact that the investors in the Independent telephone enterprises consist of farmers, small business men, and capitalists, and not capitalists alone.'"

The fight on Mr. Payne's order was kept up for nearly a year without avail. Then the Independents took the bull by the horns and laid the whole situation before President Roosevelt.

What occurred between the president and his postmaster-general is not known. But a great while did not elapse before the order giving the Bell Telephone Company a monopoly in the United States postoffices was rescinded as quietly as it had been issued. Ever since the postmasters of the various cities and towns have been at liberty to install whatever telephone system connects with the greater number of people in their locality.

CHAPTER XVIII.

AN INIQUITOUS PRESS BUREAU.

From a consideration of the Bell company's work in the field of politics, one turns naturally to its manipulation of another powerful agency—the public press. Its record here has certainly never been approached, and it is well that it has not. If all the other great public corporations should learn to use the press as this telephone corporation has used it, the people would have real cause to fear industrial enslavement.

Very early in the fight a literary bureau was established at the Boston headquarters of the Bell company, which had for its mission the dissemination of matter that should mold public opinion along the lines desired by the trust. It was hoped to establish these false premises firmly in the public mind:

That the telephone is a natural monopoly.

That a dual or competing telephone system is a hardship on the people and that it brings no advantages in the end to the subscriber.

That the Bell company was alone equipped for giving a satisfactory service and reasonable rates.

That competition was wasteful and must necessarily increase rates in the end.

That persons investing in Independent securities must inevitably lose their money.

That the Independent companies were simply being promoted by scheming manufacturers to unload worthless apparatus.

That the Bell company could furnish long-distance connections and that, without such connections, a telephone service was worthless.

That Bell telephone securities alone offer safe investments in this industrial field.

That the Independent companies are going into bankruptcy almost as fast as organized, and—

That the whole Independent movement is small, unimportant, and doomed to early extinction.

How well the Bell press bureau has done its work, every reader of this article may ascertain for himself. Ninety-nine men out of every hundred, in communities where the Independents are not in actual operation, will affirm every one of these propositions, though without exception they are untrue. And, even in places where the Independents are actually at work, plenty of people may be found who hold to these false ideas. Ask them where they get their opinions on the subject and they will be unable to tell you, except that they "know them." They are unaware that the impressions they are giving out as facts have been carefully drilled into them by the agents of the Bell Telephone Company operating through the newspapers and other publications that are willing to lend themselves to this sort of work for a money consideration. The process is as simple as it is effective. As soon as telephone opposition threatens to manifest itself in a community, there will suddenly appear, in that section of the local press that is willing to sell its reading columns for a good price, a grist of articles detailing most minutely the "severe financial loss that has come in other places to investors in Independent securities." These articles, all of them paid for at the highest "reading matter" rates, generally appear under such headlines as these, taken from the New York Press of June 25, 1905:

LOSSES IN TELEPHONE FIELD

INVESTORS IN INDEPENDENT COMPANIES SUFFER THROUGH MANY FAILURES.

In the course of a year I have received through the clipping bureaus as many as two thousand articles of this nature. They came out of all classes of papers, from the poor, cheap country weekly to the metropolitan daily. Most of the articles were exact reproductions, even to paragraphing. Invariably they were full of false statements. They appeared as regular reading matter, generally without marks to show they were paid advertisements, though now and then some publisher, with a finer sense of the proprieties, would put the tell-tale "advt." or three asterisks at the bottom. During last summer I determined to test the moral right of a publisher to use his columns in this manner. I selected the Brooklyn Eagle for the test, because that paper has always ranked as one of the leaders in all sorts of reforms, and one had a right to look to it for a high sense of duty toward its readers. I therefore wrote two letters to Dr. St. Clair McKelway, the editor, saying, among other things:

"I beg to call your attention to the inclosed clipping from your columns. It had always been my belief that the Eagle was a thoroughly honest paper, which would not lend its columns for a price, in order to deceive and mislead its readers.

"The matter set forth in the clipping is along lines to which we have become very familiar. It emanates from the press and advertising bureau of the American Bell Telephone Company, in Boston, and is paid for at so much a line.

"While we expect to find this sort of work tolerated in spots by the country press, I certainly believe you and your editorial associates on the Eagle will not sanction the misuse of your columns for pay, if the facts are properly called to your attention.

"The Bell Telephone Company is putting out this stuff for the purpose of preventing capital from investing in Independent securities.

"Incidentally, it may interest you to know the real facts connected with the alleged Independent failures set forth in the matter published by your paper.

"In the case of the North Manchester Telephone Company, the trouble is only between the stockholders. The company is a dividend payer, but the man that controls a majority of the stock is manipulating the profits so that the holders of the common stock receive no dividends.

"The United States Telephone and Telegraph Company, of Waterloo, was sold at auction simply to get a clear title. It is now owned by a company called the Corn Belt Telephone Company and is in the best of hands.

"The Orr Telephone Company, of Buffalo, was merely a wild-cat scheme of an inventor. This was not an operating concern, but was organized to develop a patent.

"The State Telephone Company, of New Jersey, was a company bought up by the Bell, and used by them to be held up as a horrible example. There are dozens of such instances on record."

I received no reply from Dr. McKelway, but an early mail brought a letter from the *business office* of the Eagle asserting that the matter had not been published as a "paid advertisement," but "as an attractive bit of financial gossip." My answer was to send the writer a score of articles clipped from papers throughout the country. They were exactly like the one published in the Eagle, word for word, paragraph for paragraph, except that at the bottom was the fatal "advt.," which the Eagle had left off. I sent him also the following extract from the Erie, Pennsylvania, Times:

"Every few days there appears in the columns of the monopoly and coal baron sheets of this city cleverly worded paid reading notices, having for their purpose the destroying of confidence in the financial standing of the Mutual and Union Telephone Companies of this city in particular and of Independent telephone companies in general. These paid notices, of course, can originate only from competitors who are being severely hurt and it is pleasant to state that, so far as Erie people are concerned, Mutual Union telephone stockholders only laugh at the ineffectiveness of the effort. The Mutual and Union Companies, of this city, are money-makers of the first order, and the future of both of them grows brighter and brighter every day. The Mutual has more business than it knows how to take care of, and the demands are greater than its facilities will supply. The companies are owned by Erie people, and they are managed by Erie men who have the entire confidence of our people."

[The continuation of Mr. Latzke's interesting story will be found in the September TELEPHONY.]

TELEPHONE LEGAL DECISIONS

A Compilation of Recent Decisions in Telephone Cases Rendered by the Upper Courts.

By R. R. Rossing.

[Hereafter TELEPHONY intends to report in this department the recent important supreme court decisions affecting telephone companies and telephone affairs. This service will be complete and up to date, including all of the courts of last resort in the United States. Managers and attorneys of telephone companies will find this department a great time-saver, as by glancing over the decisions contained therein they can obtain in ten minutes information of late cases that otherwise would require research and study of law reports covering several days. Following the headline, briefly describing the case, is given the syllabus delivered by the court condensed into few words yet covering the point of law interpreted. The names of the litigants, the name of the court and the volume and page number of the law reports are appended. For the convenience of its readers TELEPHONY has arranged to supply complete decisions of all cases mentioned in the legal digest for a nominal charge.]

TAXATION OF TELEPHONE CORPORATIONS UNDER MINNESOTA STATUTE.

THE constitutional amendment of 1895 (chapter 7, p. 14, Gen. Laws 1895), authorizing the Legislature to impose either a property or gross earnings tax upon telephone and other corporations mentioned, construed, and held an extension to the corporations therein named, without change or modification, of the gross earnings system of taxation as theretofore in force as to railroad corporations. Chapter 314, p. 581, Gen. Laws 1897, imposed such tax upon telephone companies doing business in the state, and provided that the same should be in lieu of all other taxes and assessments upon property held, owned, and used by the companies in the conduct of their business. Held authorized, and valid under the constitutional amendment referred to. State v. N. W. Telephone Co., 84 Minn. 459, 87 N. W. 1131, approved and followed.—*State v. Twin City Telephone Company, Supreme Court of Minnesota, 116 Northwestern, 835.*

NOTICE TO WIRE CHIEF IS NOTICE TO COMPANY.

In an action against plaintiff's employer for injuries from an electric wire, notice to the employer's wire chief, he being a vice principal, of the dangerous condition of the wires, which resulted in the injury, was notice to the company.—*Texarkana Telephone Company v. Pemberton, Supreme Court of Arkansas, 111 Southwestern, 257.*

TELEPHONE COMPANY ENTITLED TO REASONABLE TIME FOR REPAIRS.

A telephone company is legally entitled to a reasonable time in which to make necessary repairs, after obtaining actual knowledge or constructive notice of the defective condition of its wire, before responsibility for neglect to make proper repairs can attach.—*Cumberland Telephone & Telegraph Company v. Pierson, Supreme Court of Indiana, 84 Northeastern, 1088.*

RIGHTS UNDER KENTUCKY TELEPHONE FRANCHISE.

Const. § 163, provides that no telephone company within a city or town shall construct its poles or other apparatus along, over, under, or across the streets, alleys, or public grounds of a city or town without the consent of its legislative authority, and section 164 prohibits the town from granting such consent, except on advertisement and sale to the highest bidder. Held, that a telephone franchise within such section has not the right to operate a telephone exchange in a city, but the right to occupy some portion of the public streets for the maintenance of such line.—*Bland v.*

Cumberland Telephone & Telegraph Company, Court of Appeals of Kentucky, 109 Southwestern, 1180.

CONTRACT BETWEEN TELEPHONE LINES.

Plaintiff, as the owner and operator of a rural telephone line, the central station of which was in a town of the sixth class, contracted for an interchange of messages with defendant telephone company on a toll percentage basis, for a term of five years, without plaintiff obtaining a franchise from such town to operate telephone lines on its streets and alleys, as required by Const. §§ 163, 164. Held, that such contract was severable, and, though unenforceable in so far as it related to the use of lines illegally erected within the town, was valid and enforceable as to so much of the business as was done without materially using the streets of the town.—*Bland v. Cumberland Telephone & Telegraph Company, Court of Appeals of Kentucky, 109 Southwestern, 1180.*

LIABILITY OF TELEPHONE COMPANY FOR NEGLIGENCE.

In determining the liability of a telephone company for negligence in the transmission or delivery of a message, a telephone company will be treated as a telegraph company; "telegraph" including any apparatus for transmitting messages by means of electric signals and a "telephone" being a "telegraph."—*McLeod v. Pacific States Telephone & Telegraph Company, Supreme Court of Oregon, 95 Pacific, 1108.*

PERSON TO WHOM TELEPHONE COMPANY IS LIABLE.

Where the liability of a telephone company for negligence in the transmission or delivery of a message is based on contract, the liability is limited to the person for whose benefit the contract is made; but, where the liability is ex delicto, the company is liable to the addressee or person called to the phone by a patron for any negligence in the transmission and delivery of a message or call, when the company had notice from the message or otherwise at the time that such addressee or person had an interest therein. —*McLeod v. Pacific States Telephone & Telegraph Company, Supreme Court of Oregon, 95 Pacific, 1108.*

LIABILITY FOR FAILURE TO CALL CERTAIN PERSON TO TELEPHONE.

Where the request by a patron of a telephone company is for an office or the phone of a particular person, the company has performed its duty when it has made connection with such phone, and it is not responsible for the identity of the person answering, or the messages passing between such person and the patron; but where the company carelessly connects the patron with the wrong phone, and there is no contributory negligence on the part of the patron, the company may be liable, and, where the company contracts to produce at its own office a certain individual to answer a call, it is bound to exercise reasonable care to produce the proper person, and is liable to such person for negligence, where it had notice of his interest.—*McLeod v. Pacific States Telephone & Telegraph Company, Supreme Court of Oregon, 95 Pacific, 1108.*

EVIDENCE OF DAMAGE TO TREES.

Though the district superintendent of a telephone and telegraph company may have had no authority to make the statement that a property owner was entitled to more than $10 damages for cutting his trees, which was the amount paid him for the right to construct the line over and along his property and in full satisfaction for trimming trees, yet evidence of such statement, in an action for unnecessarily cutting the trees on the premises, was not harmful. where the undisputed evidence was that the owner actually sustained damages to the extent of $150 to $200.—*Nichols v. New York & Pennsylvania Telephone & Telegraph Company, Supreme Court of New York, 110 New York Supp., 325.*

NEGLIGENCE IN NOT FURNISHING SUFFICIENT NUMBER OF MEN TO ERECT POLE.

A master is negligent in not furnishing a sufficient number of men to enable those engaged in erecting a pole to do it in safety.—*Di Bari v. J. W. Bishop Company, Supreme Judicial Court of Massachusetts, 85 Northwestern, 89.*

INJURY BY FALL OF POLE.

An employe, injured by the fall of a pole which was being erected, was not guilty of contributory negligence as a matter of law, because, owing to confusion on his part, due to the imminence of peril and his want of experience, he failed to use the best means of escape.—*Di Bari v. J. W. Bishop Company, Supreme Judicial Court of Massachusetts, 85 Northeastern, 89.*

ENLARGEMENT OF TELEPHONE PLANT.

Telephone companies are under a general common-law obligation to supply reasonably adequate facilities, which obligation may be enforced by compelling the enlargement of the plant, but this duty is not so far applicable to Acts Tenn. 1885, p. 122, c. 66, § 11, requiring telephone companies to furnish facilities without discrimination and imposing severe penalties, as to require a departure from the company's usual custom in the service of patrons, and an increase of the company's cables for the purpose of serving an applicant whose application could not be immediately complied with because the company's cable running to his district was full. —*Cumberland Telephone & Telegraph Co. v. Kelly, United States Circuit Court of Appeals, 160 Federal, 316.*

CONTRIBUTORY NEGLIGENCE OF TELEPHONE LINEMAN.

A telephone lineman is guilty of contributory negligence, barring recovery against the telephone company for his death, caused by electric shock while descending a pole, by his stepping on a grounded telephone cable and grasping an iron brace with which an electric light company's wire was in contact, the insulation of the wire being worn off at the point of contact, where the dangerous condition was obvious on a casual observation, where by exercising ordinary care he could have descended safely, and where the telephone company not only had a rule requiring linemen to see that dangerous wires were clear of contact, but decedent had been specially instructed in that regard; the negligence not being excusable because of inadvertence or momentary thoughtlessness.—*Memphis Consolidated Gas & Electric Company and Memphis Telephone Company v. Simpson, Supreme Court of Tennessee, 109 Southwestern, 1155.*

NATURAL HISTORY OF THE TELEPHONE.

SQUIRRELS and rats are common causes of trouble to telephone managers through their gnawing proclivities, and on at least one occasion a snake has involuntarily caused a short circuit when his body was hurled into the air by the small boy and lodged among the wires. Woodpeckers are said to cost telephone and telegraph companies thousands of dollars every year in pole repairs, and the nature-fakir has it that the birds are endeavoring to capture the humming sound that proceeds from a lead of wires on a breezy day. But it remains for a Wisconsin lineman to be put to rout by a swarm of bees in a cable box. He returned. however, and secured several pounds of honey.

Beasts, reptiles, birds and insects seem to resent the intrusion of the telephone line into their native haunts. It remains for some one to invent a submarine telephone, and give the fish a chance.

The Inspector and The Troubleman

By A. E. Dobbs

[Fourth Installment.]

TELEPHONE CIRCUIT AND TROLLEY FEEDER.

HERE is a letter from an acquaintance of mine," said the manager, coming into the back room where the men were, "and I would like your opinion of it."

"'Dear Sir: Our situation is this: First, suppose a metallic telephone line is strung on poles used by an electric street railway company for about three-quarters of a mile in a city, and said poles are only about thirty feet high. Would the induction be great enough to interfere with conversation, if the lines were placed higher than the trolley wire, and transposed every fourth pole? Poles about seventy-five feet apart, two feed wires running on the same poles within two or three feet of the telephone wires. Second, on account of the great expense and objections by property owners to our erecting more poles throughout the city, we have the choice of running on the street railway poles or the electric light poles. If we run on the electric light poles, some of the street railway poles will have to be used anyway. What would you advise?'

"That," said George, "brings up a somewhat difficult question, but it is one that confronts nearly all telephone managers to a greater or less extent. It would be better,

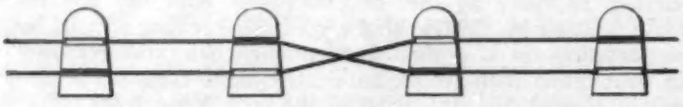


Figure 10.

of course, if they could erect their own poles and keep as far away from trolley and electric light wires as possible, the farther away the better; but we have to take conditions as we find them, not as we would like to have them. Perhaps there will be only one subscriber in the section he speaks of. If there should happen to be more, his best plan would be to put a crossarm on the poles, use a double-grooved glass, a good grade of weatherproof wire, copper preferred, and tie two wires on one glass. In this way a ten-pin arm would allow him to string ten circuits."

"Do you mean," said the manager, "that the wires should be as close together as that? One wire in the upper groove, and one in the lower, would make considerable escape in wet weather, would it not?"

"Yes," said George, "there would be some leakage, but not so much as you might imagine. Rain water is not such a good conductor as is commonly supposed."

"Why, I thought water one of the best conductors!" exclaimed the manager in astonishment. "In seeking a ground do you not look for damp earth, the bed of a stream, or even a well, if a water pipe cannot be obtained?"

"Yes," said George, "because damp earth is much better than dry earth, which is generally a pretty fair insulator, though I have found soil so constituted that even dry dust would make a pretty good ground.

"But you must remember I said rain water. To prove that this is the case, we will make a measurement right now. William, go across the street and get me a bucketful of cistern water. Now this water," he continued, when Will had returned, "has been in contact with brick and cement, and is, therefore, not so pure as when it fell from the clouds, but it will answer our purpose. Now take two pieces of this rubber-covered wire and scrape the ends back for about an inch. Now pour that water into this wooden pail and bring it over to where the testing set is."

George had persuaded the manager some time previously

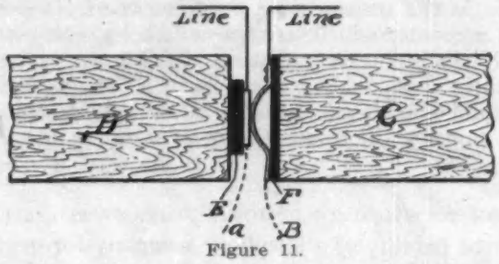


Figure 11.

to furnish a portable Wheatstone bridge and galvanometer as part of the office equipment, and he now proceeded to take his measurements.

To the surprise of the manager and the astonishment of Will the measurements with current from six dry cells showed a resistance varying from 20,000 to 30,000 ohms, even when the wires were placed only an inch apart.

"Well, I'll be hanged!" said the manager, "I'll never have another driven ground-rod on any telephone line that I have anything to do with."

"A very good resolution," said George, "though it must be remembered that a ground-rod has much more surface than the ends of these wires. Then water containing various kinds of soil in solution or suspension possesses much higher conductivity than the comparatively pure water we have just been experimenting with." He then proceeded to show that by mixing mud, various kinds of salts, lime, etc., with the water, its resistance was very much decreased.

But during this little discussion the manager had not lost sight of the original subject, and he now wanted to know if

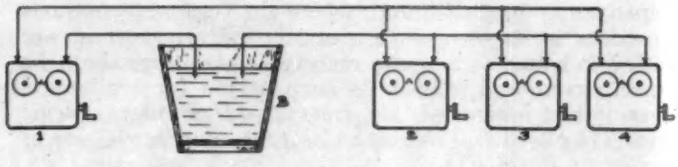


Figure 12.

two wires run on one glass would not be crossed up continually.

"It depends on who strings the wire," said George. "If the wires are pulled up tight and evenly spaced, they can easily be run two inches apart."

"Hold on," said Will, who wanted to be exact. "The grooves in those insulators are only an inch and a half apart."

"True enough," replied George. "But with one wire tied on the inside and the other on the outside of the glass they would easily be two inches apart. And if you remember

correctly, I said the best grade of weatherproof wire should be used in this, although I can string bare wires at that distance and never have any trouble with them. You might even use one bare and one insulated wire. It would matter little to successful telephone working if the insulation between the two wires of a metallic circuit should fall to 30,000 ohms in damp weather. And another advantage of that plan is that by stringing two wires on one glass, he could make continuous running transpositions by stringing out two wires at one time and having the men who carry the reels or coils cross each other in every section. Besides, these poles are only seventy-five feet apart, which makes it an easy proposition." George here hastily drew a sketch (Figure 10) which shows the wire passing on the front and back of the glass. For the sake of clearness the tie is omitted.

"That is quite a scheme," said Mr. Risk, doubtfully, "but it doesn't look very safe to me. It seems to me these wires would be very close together."

"Yes, but you never did any line work in New York in the old times before they had any underground service there," said George. "We used to run wires as close together as we could place knobs and insulators, and much of it was very poorly strung and in long sections—in some cases as far as three hundred feet—at that."

"Did you not have some trouble with that kind of work?"

"Yes, to be sure, we had lots of trouble, but the trouble account was very small considering the way the wires were run. I never used to look for trouble in places where I knew the wires were tight. The advantage of placing the wires of a metallic circuit so close together," he continued, "is that their mutual induction and constant transpositions tend to neutralize any foreign influence in their immediate neighborhood.

"I would also say that if no more than one line is likely to be built to the neighborhood of which he speaks, he can put a single bracket near the top of the pole, using the double-grooved glass I have mentioned; but if the lines are to be increased in that direction, he can keep farther away from the feed wires by using a ten-pin crossarm. I will further say that in order to get his wires tight and even he should first string out a half mile of it and then pull them both together as tight as they will stand it, then go back and tie them in before the strain is taken off. I hope, though, that this gentleman will get business enough in that neighborhood to build a pole line of his own. He might even make arrangement with the street railway company to set poles of his own in place of theirs, and in this way be able to get up at least ten feet higher than the trolley feeder. Of course, I am laying down this advice on the supposition that he wants to give good service and obtain a quiet line. Where they are not so particular, linemen will frequently nail two brackets—in some cases even porcelain knobs—on the pole above the trolley feeder and run out with bare wire, using no tranpositions at all."

"Would it not be better to run those wires further apart?" queried the manager, who still seemed a little doubtful of this plan.

"No," replied George, "for then the feed wires of the railway system would not affect them both equally. The object in running them close together is to expose them both to exactly the same inductive influence, whereby the effect on one wire is largely neutralized bv the same effect on the opposite wire."

"Could we run a circuit alongside of a trolley road for a hundred miles?" asked Will.

"Yes," replied George, "by making the proper number of transpositions, using some non-inductive wire, such as copper, aluminum or phosphor-bronze, and keeping the line absolutely free from the ground, and keeping as far away from the trolley road as possible. Then there are other details to be considered, such as distance between wires, kind of insulators to use, etc. Do not forget, however, to insulate the line well, for alongside a trolley road the leaf of a tree may become a very serious disturbing factor.

"I was asked the other day how to get a line across a draw-bridge so that the line would open and close with the bridge," said Mr. Risk.

"Why don't he get some rubber covered wire and throw it in the river so that the line will stay closed all the time?" asked George.

"I don't know."

"Well, knowing nothing of the conditions, I can tell him but very little except to show him one plan sometimes used by the trolley roads under similar conditions. In Figure 11 we will suppose the break between C and D to represent the connection between the ends of the draw-bridge. In this case the copper plate A is placed upon a block of insulated wood coated with asphaltum from which one line is connected. B is likewise mounted upon a block of insulating material and consists of a spring fastened at the upper end and free at the other which, when the bridge is closed, firmly presses against the plate A. Of course, it will now be seen that when the swing D C is opened the line is also opened and vice versa."

"Here is still another one," laughed the manager. "'Can you suggest some test by which I can find out whether six bridging bells that I have will ring each other in multiple through a line resistance of 2,000 ohms?'"

"I can only suggest a rough-and-ready test," answered George. "As a general thing when tests of this kind are required, the construction man does not possess a graded resistance box, or any other kind within easy reach. This method is sometimes used, and it is satisfactory enough for all practical purposes, although it is a severe test. Take a wooden or paper pail B, Figure 12, and fill with rain water, or at least with a water that is soft and comparatively pure; connect up the telephones 2, 3, 4 in multiple, placing the bucket B between No. 1 and the others in the series through the line. Let the two ends of the wire extend into the water not to exceed one-quarter of an inch; you can now feel certain that you have got a water resistance of at least 10,000 ohms, or as we have seen, it may be much more. If the bells 2, 3, 4 ring through this resistance you can feel reasonably certain that No. 1 will do its work on the line.

"The difficulties under which a telephone will sometimes do its work," said George, one morning, "are shown in a case that once came under my own personal observation.

"The line was a grounded one, built through a timbered and swampy country for about twenty-five miles, using iron wire having a resistance of about twenty-six ohms per mile, and in this case six telephones bridged on. The distance between stations *1* and *3* was about eleven miles. Half a mile from station *1*, the wire was broken and at least fifty feet of it lying on wet, boggy ground and ten feet in a stream running through it. Between stations *1* and *2* a fallen tree had removed the wire from its pin, and pushed it down into the mud of a swamp lying on the same stream, while half-way between stations *2* and *3* was a cross with another wire, one end of which was lying on the ground. Added to this was a considerable leakage through trees above station *3*; and yet in spite of all this stations *1* and *3* were able to ring each other, and by shouting and repeating somewhat, able to do business over the line.

"To make this result more astonishing the batteries were in very bad condition and the receivers having lost most of their magnetism, were very inefficient. The instruments were equipped with 1,000-ohm ringers and 500-ohm induction coils.

"Some of our friends who have seen lines completely knocked out by apparently less trouble than is here shown may consider this as an exaggeration, but let us take all the

factors into account. In the first place, there had recently been many heavy rains, and the water in the stream and swamps was therefore fresh and soft, and as there is no lime or other hardening ingredients in the soil, the water remains soft and quite pure all the year round, it being much used for drinking purposes, and it tastes much like rain water, which it really is. Now water of this kind possesses a much higher resistance than is generally supposed, and it is quite fair to suppose that the ground resistances were 1,000 ohms each, making 500 ohms for the two. The cross was higher still. But let us suppose that the resistance of the line was as low as 400 ohms. In the talking-circuit we would have:

Line resistance	300 ohms
Two induction coils	1,000 ohms
Two receivers	150 ohms
Total	1,450 ohms

"Thus we have a divided circuit to earth of 400 ohms on one side and 1,450 ohms on the other, a proportion of about 3.5 to 1, and judging by the volume of sound, that was just about the amount of current passed. It must not be forgotten, also, that an almost infinitesimal amount of current will work a telephone receiver."

THE KANSAS CITY COMPANY'S REPORT

Remarkable Indications of Prosperity and Excellent Management in an Independent Telephone Company

By J. C. Ames

THE report of the Kansas City Home Telephone Company and Kansas City Long Distance Telephone Company for the year ending March 31, 1908, recently issued from the general offices of the company, shows a very flattering condition of a noteworthy Independent telephone installation. The officers of the Kansas City Home Telephone Company are: Joseph J. Heim, president; Henry Koehler, Jr., vice president; O. C. Snider, vice president and treasurer, and Hugh C. Ward, secretary, and the directors are: Lee Benoist, Joseph J. Heim, Henry Koehler, Jr., John H. Rogers, Walter S. Dickey, Arnold Kalman, Max Koehler, O. C. Snider, Edward George, W. J. Kavanagh, A. W. Lambert and Hugh C. Ward.

Of the long distance company Mr. Snyder is president and treasurer, while Mr. Heim is vice president and Mr. Ward secretary. Mr. Snider is general manager of both companies.

President Heim and Manager Snyder are to be congratulated upon the excellent showing of the report, the text of which is given here:

"To the Stockholders: June 15, 1908.

"It is very gratifying to the management of the Kansas City Home Telephone Company to report the result of the operations of that company and its subsidiary, the Kansas City Long Distance Telephone Company, for the fiscal year ending March 31, 1908, and to make certain comparisons for the first four years of their history; proving beyond question the unlimited resources and commercial growth of the territory occupied by your interests.

THE KANSAS CITY HOME TELEPHONE COMPANY.

	March 31, 1905.	March 31, 1906.	March 31, 1907.	March 31, 1908.
Gross earnings	$406,016.54	$527,659.46	$658,897.42	$766,945.93
Expenses	230,349.22	280,169.14	361,460.29	412,970.94
Net earnings	$175,667.32	$247,490.32	$297,437.13	$353,974.99
Interest	126,191.34	125,819.77	140,168.59	150,101.56
Surplus	$ 49,475.98	$121,670.55	$157,268.54	$203,873.43

KANSAS CITY LONG DISTANCE TELEPHONE COMPANY.

	March 31, 1905.	March 31, 1906.	March 31, 1907.	March 31, 1908.
Gross earnings	$ 25,730.41	$ 67,849.49	$133,976.65	$188,266.55
Expenses	9,875.30	21,443.54	54,250.41	79,340.06
Net earnings	$ 15,985.11	$ 46,405.95	$ 79,726.24	$108,926.49
Interest	18,935.00	30,000.00	46,110.54	53,882.93
Surplus	$ 2,949.89	$ 16,405.95	$ 33,615.70	$ 55,043.56

"The above figures show that the combined net earnings of both companies have increased in 1908 to $258,916.99 as against $190,884.24 in 1907, a gain of $68,032.75 in one year. The total surplus earnings of the two companies for the year 1908 amount to 10.9 per cent on the outstanding stock of the Kansas City Home Telephone Company, and since the organization of the company the sum of $363,186.25 has been paid to the stockholders in dividends after all expenses and interest charges have been liquidated.

"A statement of the number of telephones in service, the average earnings, expenses, net earnings and surplus per telephone for the past four years is as follows:

	March 31, 1905.	March 31, 1906.	March 31, 1907.	March 31, 1908.
Number of telephones	11,389	14,831	18,661	20,146
Gross earnings per telephone	$42.05	$40.72	$38.54	$39.07
Expenses per telephone	23.86	21.62	21.14	21.04
Net earnings	$18.19	$19.10	$17.40	$18.03
Interest per telephone	13.07	9.71	8.20	7.64
Surplus	$ 5.12	$ 9.39	$ 9.20	$10.39

"During the year 1905 the average gross earnings per telephone were larger than during the succeeding years, owing to the fact that the number of business telephones at a higher rate was much greater than the number of residence telephones and as the residence service at a lower rate increased, the average necessarily decreased.

"The foregoing comparative statement of earnings of the Long Distance Telephone Company shows a very satisfactory growth. The earnings are derived from both long distance lines and local operating companies. The company now owns 999 miles of long distance pole lines, 3,908 circuit miles of long distance wire, five local exchanges and 5,201 telephones. During the last fiscal year this company handled 625,950 long distance messages.

"The following statement showing the earnings per unit is of interest:

	Toll Line. Per mile pole line.	Toll Line. Per circuit mile of wire.	Toll Line. Per toll message.	Exchanges. Per telephone.
Gross earnings	$181.50	$46.40	.28 9-10	$14.75
Expenses (including commission and mileage paid on toll lines)	101.68	26.00	.16 2-10	8.31
Net earnings	$ 79.82	$20.40	.12 7-10	$ 6.44
Less interest and bad debts	39.34	10.05	.06 3-10	3.51
Surplus earnings	$ 40.48	$10.35	.06 4-10	$ 2.93

"It has at all times been the policy of the company to furnish the highest class of service. The most competent op-

erators obtainable are engaged and every reasonable means is employed to provide for their comfort while on duty. Daily tests of service are made, and the result of these tests for the past year shows that the average time required by operators to answer calls was 3.53 seconds, and it is the constant aim of the company to make its service even more efficient. During the year 4,383 service complaints were received from our subscribers, a very small percentage in consideration of the fact that the average number of week day calls was 297,151, or a total of 97,959,843 for the entire year. The year's record shows that 14.9 calls per day per single line and 11.7 calls per day per telephone were handled.

"No expense has been spared to maintain the physical property of both companies in the most perfect condition, and the highest order of workmanship prevails in all departments. During the past four years the following items have been charged to maintenance:

	Home company.	Long distance company.
March 31, 1905	$ 63,939.80	$ 2,089.55
March 31, 1906	93,035.42	6,532.52
March 31, 1907	119,003.72	17,229.53
March 31, 1908	140,549.19	22,737.28
Total	$416,528.13	$48,588.88

Total both companies—$465,117.01.

"A conception of the magnitude of the system is obtained from the following detailed statement of the tangible property:

	Home company.	Long distance company.	Total.
Exchanges	7	5	12
Telephones	20,146	5,201	25,347
Poles	21,756	46,479	68,235
Cable (miles)	213.7	15.7	229.4
Bare wire (miles)	5,267	8,510	13,777
Total wire (miles) (including wire in cables)	51,152.8	16,005.2	67,158
Conduit (duct miles)	218.56	4.41	222.97
Man holes	435	13	448

"Owing to the rapid growth of Kansas City and the great development of the commercially adjacent territory, it has been necessary to increase the telephone facilities of the company from time to time. The same high grade of construction has been maintained with the new work as with the original plant, and all additions to the property have been inspected and approved periodically by Mr. Chas. H. Ledlie, consulting engineer. The construction accounts of the two companies for the past four years are as follows:

	Home company.	Long distance company.
March 31, 1905	$ 597,413.71	
March 31, 1906	372,296.37	$309,776.80
March 31, 1907	336,637.48	245,800.55
March 31, 1908	134,030.56	21,788.31
Total	$1,440,378.12	$577,365.66

Total both companies—$2,017,743.78.

"Attention should be called to the fact that a large portion of the construction account of the Long Distance Company, was used in the acquisition of several desirable and profitable local companies occuping advantageous positions in our territory. During the last six months of the fiscal year just ended it has been the endeavor of the directors to curtail all capital expenditures as much as possible on account of unfavorable financial conditions, and fully seventy per cent of the construction charge in both companies was made during the first six months of the year.

"The company is indebted to its employes for the most efficient service and acknowledges that a large measure of its unparalleled success is due to their loyalty. The number of employes in each department is set forth below:

THE KANSAS CITY HOME TELEPHONE COMPANY.

	March 31, '05.	March 31, '06.	March 31, '07.	March 31, '08.
Construction and maintenance	177	280	213	161
Operating	283	335	437	485
Officers and clerks	62	72	70	71
Total	522	687	720	717

KANSAS CITY LONG DISTANCE TELEPHONE COMPANY.

	March 31, '05.	March 31, '06.	March 31, '07.	March 31, 08.
Construction and maintenance	18	56	98	34
Operating	..	9	54	75
Officers and clerks	5	5	17	23
Total	24	70	169	132

Total number employes Home company	717
Total number employes L. D. company	132
Total number employes both companies	849

"All of the above has been compiled from the records of the company, which are examined each year by Messrs. Dickinson, Wilmott & Sterrett, certified accountants, whose reports are on file in the offices of the company.

"Very truly yours,

"Joseph J. Heim, President."

THE ORIGIN OF "LOOK FOR THE SHIELD."

THERE is probably not a telephone man in the country but is familiar with the Independent's slogan, "Look for the Shield." It has furnished the title and theme for innumerable talks and papers at telephone conventions and articles and editorials in the journals devoted to the Independent cause, and has been industriously exploited by enterprising manufacturers and exchange managers until it has come to be the accepted watchword of the Independent telephone interests, just as the "Shield" is the recognized symbol of the movement, as the blue bell signifies the opposition. As to how or where the phrase originated, or who first gave it expression, very few are informed.

It will be remembered that at the first convention of the National-Interstate Telephone Association the amalgamation of the National and Interstate bodies and the predecessor of the present international organization, the "Shield" was unanimously adopted as the official emblem of Independent telephony, the need for a symbol, particularly for toll signs, being recognized as imperative. A few months later a gentleman actively identified with an important long-distance company called at the association headquarters, then in Cleveland, Ohio, and in the course of conversation with one of the officers deplored the lack of a motto for the Independents—"a sort of rallying cry," as he expressed it—and tentatively suggested "Look for the Shield," a phrase which his company was introducing in its advertising.

The suggestion was accordingly placed before the Independent people through the medium of the telephone journals. It took from the first, and today not only the "Shield" but its accompanying legend as well, is an integral part of the printed matter of up-to-date Independent companies is found on the official publications of the telephone association, and in the form of a banner is expected as the center of the decorative scheme at every telephone convention.

The "Shield" and the slogan, like the Independent telephone movement, are here to stay, and it seems fitting at this time to record that the United States Telephone Company of Cleveland, Ohio, while it has never made any claim as to the origin of the device, was the first telephone company to use the "Shield" and to introduce the slogan—and the man responsible for the general adoption of the latter was E. D. Kramer, then traffic manager of the United States Telephone Company.

Managers of telephone lines say that it requires about a year for the subscribers on rural lines to quit "rubbering."

THE COMMERCIAL ASPECT OF INVENTIONS

The Second of a Series of Logical Articles on this Interesting Subject

By Max W. Zabel

IN THE previous article on this subject it was pointed out that even though we consider the large amount of money that is spent for unsatisfactory patents, yet the aggregate profits made are equal to many times the expenditure, showing the profitable nature of the average patent. It was also pointed out that from an equitable standpoint from fifty to possibly ninety per cent of the credit for the success of a patent is due to the money invested to market it and the business ability back of this investment.

Of course it is not always necessary to assign an interest in an invention to the prospective marketers or promoters, and the inventor may be able to secure the necessary co-operation of investors on a royalty agreement. This latter frequently is the better plan if it can be followed.

There are a number of matters in connection with making or executing assignments or licenses of rights in patents or pending applications which it is well to bear in mind when signing such papers. When any paper affecting the title to, or a portion of the title to, or any rights in, a patent or a patent application, has been drawn up and signed it should be recorded in the United States Patent Office within three months from the date of such signature. The person to whom such grant, assignment or transfer is made should insist for his own benefit that such paper be recorded. The reason for this is due to the following conditions: Should an owner A of a patent or any individual interest therein execute, say on July 1, 1908, an assignment of such interest or a part thereof to B, and B does not have this assignment recorded before October 1, 1908; then should A subsequently to October 1, 1908, and before the assignment is recorded, assign, for a consideration, the same identical interest to C, who does not know of the previous assignment of this interest to B, and C then has this later assignment to himself recorded before B has his assignment recorded, then the assignment to C is good as against B, and B has no interest in the patent, although, of course, he may sue A for any damages sustained. For this reason assignments should be recorded in the Patent Office as promptly as possible.

Tersely stated the above paragraphs mean: An assignment is void as against any subsequent purchaser for a valuable consideration without notice unless recorded in the Patent Office within three months from date thereof.

It is a custom very largely followed that when a patentee who owns the entire right, title, and interest in a patent is desirous of selling or otherwise transferring undivided interests in his patent, he executes an unconditional assignment, not probably aware of what rights this confers on the assignees. To take a specific example, let us assume that A, who owns the entire right, title, and interest in an invention, is desirous of having B, C and D each share equally with him in the proceeds of the patent, B, C and D probably furnishing the necessary funds for the promotion of the patent; and it is intended that each should own a one-fourth interest.

The usual procedure then is to draw up and execute an assignment which is substantially as follows:

"Whereas, I, A————, of ———— County of ———— and State of ————, have invented a certain new and useful improvement in ———— systems, for which I have made application at the Patent Office for Letters Patent of the United States and which application was filed on ————, 1908, and bears the serial number ——; and whereas B———— of ———— County of ———— and State of ————, is desirous of acquiring an undivided one-fourth of the entire right, title and interest in said invention and in the letters patent that may be granted therefor in this and any foreign countries.

"Now, therefore, to all whom it may concern, be it known that for and in consideration of the sum of ———— dollars to me in hand paid, receipt whereof is hereby acknowledged in full, I, the said A————, have sold, assigned and transferred, and by these presents do sell, assign and transfer, unto the said B———— a one-fourth of the entire right, title and interest in the said invention and the letters patent both domestic and foreign to be granted therefore to be held and enjoyed by the said B———— to the full end of the term for which said letters patent may be granted as fully as the said one-fourth interest would have been held and enjoyed by me had this assignment not been made.

"I authorize and request the Commissioner of Patents of the United States to issue the said letters patent to the said B———— and myself in accordance with our respective interests as they appear herein, for the sole use and behoof of the said B———— and myself.

"In testimony whereof I have hereunto set my hand and affixed my seal this ———— day of ————, 1908.

A————.

Witnesses:

E————.

F————.

Similar assignments would then be executed to assign the other two one-fourth interests and the commissioner directed to issue the patent in accordance with all interests so that the patent finally comes out and shows in its headlines that A, B, C and D each own an undivided one-fourth interest in the patent, in other words, the patent is held jointly and in equal values by the four individuals respectively.

Now what is the result of this procedure?

It appears upon the records that each of the four own unqualifiedly a one-fourth interest. Now it probably was the intention of the four parties that neither one should do anything with his one-fourth interest without consulting the other parties, in other words that they should act in unison on all matters pertaining to this point, and that by assigning only a fourth interest to each one that neither one alone could convey any rights under the patent to other parties. Such, however, is not the legal status of anyone holding an undivided interest (however small) in a patent. Whenever several persons each hold an undivided interest in a patent they are legally called "tenants in common."

"Any tenant in common of a patent right may exercise that patent right to any extent he pleases *without* the consent of any of his co-tenants."—(*Article 294, Walker on Patents.*)

He may make, use and sell specimens of the patented invention to any extent and may license others to do so; and neither he nor his licensees can be enjoined from a continuance in so doing. Nor can any recovery of profits or damages be had against any such licensee at the suit of any co-tenant of any such licensor.

The decisions in the courts of the different states are contradictory as to whether it is possible for any co-tenants to collect from any co-tenant who makes, sells and keeps to himself the profits from the sale of the patented devices. Some state courts hold that under the conditions of the preceding paragraph collection for damages is possible, and others again hold that it is impossible. But the decisions

are uniform that any co-tenant or owner of an undivided interest in a patent can license as many people to use and sell the invention as he desires, and the remaining co-tenants get nothing.

To overcome this objectionable condition various forms of agreement have been drawn up, but the assignments having once been made in the form outlined above, these agreements are of little value except possibly as "gentlemen's agreements," which hold good only as long as the signatories to the same are willing to abide by them, as they offer no tangible means of redress should they be broken.

A form of the above style of contract is substantially as follows:

AGREEMENT.

This agreement entered into this ——— day of ———, 1908, by and between A———, B———, C———, of ——— County of ———, State of ———, witnesseth:

That whereas, the said A———, B——— and C——— are each and every one possessed of a one-third interest in the whole right, title and interest in and to the following inventions, to-wit:

U. S. application of John Doe, Serial Number 244016, filed Mar. 6, 1908.

U. S. application of Richard Roe, Serial Number 610,056, filed Jan. 5, 1908.

All relating to a ——— system, by virtue of an assignment to the said parties A———, B——— and C———, and duly recorded in the U. S. Patent Office, and,

Whereas, The said parties, to-wit, A———, B——— and C———, are desirous of conserving a community of interests in said inventions and the letters patent that may be granted therefor, now, therefore, in consideration of one dollar each to the other in hand paid, receipt whereof is hereby acknowledged in full, and the faithful performance of mutual covenants, it is agreed by and between the parties hereto as follows:

That no rights, license, shop rights or options under the said applications or the patents that may be granted therefor, or under the rights obtained by the said assignments before mentioned, shall be given by either of the parties hereto, or their heirs or assigns, to any company, corporation, association, partnership or individuals without the consent of the remaining parties hereto of interest, and that a unanimous consent of all the parties having an interest in the said inventions or the patents issued thereon shall be necessary to confer any rights thereunder not already granted.

The assignments before mentioned are a part consideration of this agreement.

A———.
B———.
C———.

Such an agreement as the above, not affecting the title to all or a portion of said invention, cannot be recorded, as Article No. 198 of the United States Patent Office Rules of Practice provides as follows:

"No instrument will be recorded which is not in the English language and which does not, in the judgment of the Commissioner, amount to an assignment, grant, mortgage, lien, incumbrance, or license, or which does not affect the title of the patent or invention to which it relates. Such instrument should identify the patent by date and number; or, if the invention be unpatented, the name of the inventor, the serial number and date of application should be stated."

Therefore such an agreement subsequently made would not be recorded, and therefore no notice would be implied against a purchaser for a valuable consideration of the interest of any of the parties to the above agreement, and the sale would constitute a valid transaction. True, in the face of the agreement it might be possible for the remaining co-tenants to sue the co-tenant who sold out his interest, but naturally it would be difficult to prove actual damages. At any rate, the sale by any one of the co-tenants of his interest would defeat the scheme designed for exploiting the patent under the community of interests plan, as the new purchaser can give licenses and rights under his interest, as before stated, without accounting to the remaining co-tenants; and, as stated, the above agreement would not make it impossible for any co-tenant to sell out his interest.

For the above reasons it will be seen that the ordinary form of assignment usually employed conveys rights greater than it is usually intended to convey.

Usually when the owner of the entire right, title and interest in a patent is willing to give part interests to others, he intends that such interests when conveyed will establish as it were a joint ownership, the granting of whatever rights under which will require a unanimous consent of all having such rights. But by making assignments such as previously given, and which are of the ordinary form, he defeats that purpose and conveys interests which are in no way bound to respect his wishes or the wishes of the other co-tenants, such rights acquired under such assignments being of a character independent of the remaining rights.

The proper solution of this problem, so that the various owners of part interests an invention are bound to consult each other's wishes and to act unanimously or in accordance with the wishes of the majority for the greatest mutual benefit, seems to reside in creating a trusteeship for said invention, and, if so desired, appointing the various owners of interests in said invention as trustees. The whole right title and interest is then assigned or conveyed to these trustees, whose unanimous consent is then necessary to convey any rights. Thus a community of interests is conserved.

There are, of course, other ways to accomplish the same result, but the above seems to be the simplest, entailing as it does little if any more work and expense than the preparation of the ordinary assignments.

Another rule of the United States Patent Office in this connection is of interest. It is the rule numbered 199, which reads as follows:

"Assignments which are made conditional on the performance of certain stipulations, as the payment of money (for instance), if recorded in the office, are regarded as absolute assignments until canceled with the written consent of both parties or by the decree of a competent court. The office has no means of determining whether such conditions have been fulfilled."

It will be noted from this that the assignment is regarded as absolute, and the assignee of such interest could legally dispose of such interest to an innocent purchaser for a valuable consideration, and the sale would be good even though "certain stipulations" have not been fulfilled.

It might properly be stated here that a license, or shopright, cannot be construed as an assignment of an interest, and does not come under the above mentioned rules, as such license or shopright is not transferable or assignable unless it is so specifically stated in said license, or shopright. Such latter form of conveying rights under a patent are of interest in this connection and will therefore be taken up a little more in detail. As before stated, an assignment of a patent is a writing which conveys the entire right, title and interest in a patent or an undivided portion thereof. The usual form was given above.

A grant of a patent right is a written conveyance of the entire right, title and interest or undivided portion thereof within and throughout a certain specified portion of the territory of the United States and no other portion. Under this head come the familiar "county rights" with which so many people have had unsatisfactory experiences. The rules above given relating to assignments hold good generally as regards grants, and no special form of grant need here be given, as the wording is similar to the wording of an assignment, requiring only the obvious substitutions.

A license is any other form of conveyance affecting a right under a patent, and which does not amount to an assignment or a grant. No license is required to be recorded, and said license is good as against anybody, and a purchaser of a patent takes it subject to all outstanding licenses.

A license not expressly limited extends throughout the life of the patent, and what is of more importance, "Forfeiture of a license does not follow from the single fact that the licensee has broken some covenant which was made by him

when accepting the license, unless the parties expressly agreed that such a forfeiture should follow such a breach. And even where such an agreement is made it will not always be enforced." (*Walker on Patents.*)

Of course, a continued refusal to pay royalties accrued may eventually work a forfeiture.

A familiar form of license is given below:

This agreement made this ——— day of ———, 1908, between ——— of ———, county of ———, state of ——— party of the first part and ——— of ——— county of ——— and state of ——— party of the second part witnesseth that whereas letters patent of the United States No. ——— for improvement in ——— were granted to the party of the first part on the——— day of ——— 1908; and whereas the party of the second part is desirous of manufacturing ——— containing said patented improvements,

Now therefore the parties have agreed as follows:

1. That party of the first part hereby licenses and empowers the party of the second part to manufacture subject to the conditions hereinafter named at their factory in ——— and in no other place or places to the end of the term from which said letters patent were granted ——— containing the patented improvements and to sell the same within the United States.

2. The party of the second part agrees to make full and true returns to the party of the first part under oath upon the first day of ——— and ——— in each year of all——— containing the patented improvements manufactured by them.

3. The party of the second part agrees to pay to the party of the first part ——— dollars as a license fee upon every ——— manufactured by said party of the second part containing the patented improvements; provided that if the said fee be paid upon the days herein provided for semi-annual returns or within ——— days thereafter a discount of ——— per cent shall be made from said fee for prompt payment.

4. Upon a failure of the party of the second part to make returns or to make payment of license fees as herein provided for ——— days after the days herein named the party of the first part may terminate this license by serving a written notice upon the party of the second part; but the party of the second part shall not thereby be discharged from any liability to the party of the first part for any license fees due at the time of the source of said notice.

In witness whereof the parties above named have hereunto set their hands the day and year first above written at ———, county of ——— and state of ———.

Witnesses.

The discussion regarding rights under patents is not complete without reference to shoprights and exclusive or non-exclusive conditional royalty contracts and which will be taken up in the next article.

THE MISSISSIPPI ASSOCIATION

A Report of the New Independent Telephone Association's First Regular Meeting

By R. D. Fisher

RESOLUTION ADOPTED BY THE MISSISSIPPI INDEPENDENT TELEPHONE ASSOCIATION:

Whereas, The Western Electric Company, a subsidiary company of the Bell Telephone Company, has persistently and unceasingly persecuted and harassed the Independent telephone interests of the country for the last twelve years by suits and threats of suits and intimidating investors and subscribers, and

Whereas, These suits have been defended largely at the expense, skill and energy of the Independent manufacturers, who have perfected apparatus superior to that made by the Western Electric Company, and

Whereas, At the dictation of the Bell Telephone Company said Western Electric Company and other manufacturing companies are offering their wares outright to the Independent companies at cut rates in order, as we believe, to gain a footing with the Independent companies, so as to ultimately buy in the Independent companies to advantage (after equipping them with Bell apparatus), therefore, be it

RESOLVED, That the members of the Mississippi Independent Telephone Association unanimously agree that they will not purchase or use equipment offered by such companies; be it further

RESOLVED, That we buy apparatus only from such companies as use the stamps and shields legally; be it further

RESOLVED, That a copy of these resolutions be forwarded to the secretary of the international association and to all the trade papers for publication.

THE Mississippi Independent Telephone Association, which was organized at Tupelo, Miss., May 21, held its first regular meeting July 2 at Memphis, Tenn. The meeting was called to order in the green room of the Gayoso hotel by President J. B. Shannon promptly at 10 o'clock, and nearly every member was present.

President Shannon made a short address, expressing the object of the association to the new members and commenting upon the progress the association had made since the original meeting, requesting that each member make an effort to attend the meetings and bring a new member with him.

Minutes of the last meeting were then read by the secretary, S. L. Pake, and approved.

A report of the committee on constitution was called, and after some discussion each article was taken up and either corrected or approved by the association.

The adopted form of the constitution is given below:

CONSTITUTION.

Article One.—The name of this association shall be The Mississippi Independent Telephone Association.

Article Two.—The aim and purpose of this association is to bring together the Independent telephone interests in the state of Mississippi for a firmer union and interest, exchange of ideas as to a more uniform construction, operation and maintenance of our systems, to enforce the laws that will encourage and stimulate development of our property and encourage more interest in the Independent telephone business.

Article Three.—The officers of this association shall consist of a president, a vice-president, a secretary and treasurer and an executive committee, to hold office one year, or until their successors are elected. The president shall be the chairman and a member of the executive committee and the remaining members of said committee shall be appointed by the president, subject to the approval of the members of said association.

Article Four.—The officers of this association shall be elected by ballot upon the adoption of this constitution and thereafter annually. No officer of this association shall be entitled to a salary for services rendered to the association, but such officers shall be entitled to their traveling expenses when away from home on the exclusive business of the association, except when attending the meetings of the association.

Article Five.—The president shall preside at all meetings of the association and executive committee, and shall approve and countersign all orders drawn on the treasurer of association for expense; shall make all contracts and sign other papers for the as-

sociation and perform such duties as may be prescribed by the association or this constitution.

The vice-president shall act in the absence of the president and perform such duties as would devolve upon the president if personally present.

The secretary shall keep the record of this association and notify all members of any general or special meetings of the same to be held, draw all orders on the treasurer after approval by the president, and perform such duties as the executive committee of this constitution requires.

The treasurer shall collect all monies herein provided for and safely keep and pay the same upon the order of the president. He shall also be the custodian of all other papers and contracts except the records of the secretary. The association can make the same person both secretary and treasurer if thought necessary.

Article Six.—The dues of the members of the association shall be one dollar per annum, same to be paid in advance.

Article Seven.—A committee of two shall be selected at each regular meeting to arrange for a program of exercises at the next regular meeting.

Article Eight.—The constitution may be amended by a majority vote present at any regular meeting or any special meeting after ten days' notice to the members of the purpose of the meeting.

Article Nine.—Any person, firm, company or corporation, as such owning, operating, manufacturing or selling an Independent telephone business in Mississippi or Tennessee shall be eligible to membership in this association upon an affirmative two-thirds vote of the members present at any regular or called meeting of the association, upon the payment of the membership fee.

Article Ten.—All applications for membership must be submitted to the executive committee by the secretary for examination in writing and may be elected at next regular meeting by ballot if approved by the executive committee.

The chairman then read and presented to the association the anti-Bell resolution, which is given on this page, and it was unanimously and enthusiastically adopted.

Upon the motion of R. H. Polk of the Memphis Telephone Company, and seconded by Dr. J. W. Vaughn of Pott's Camp, Miss., J. B. Shannon of the Southwestern Telephone and Telegraph Company of New Albany, Miss., temporary chairman, was nominated for president of the association, and S. L. Pake, general manager of the Okolona Telephone Company, Okolona, Miss., was nominated for secretary and treasurer. Mr. D. O. Eastman of Boonville, Miss., was nominated for vice president. All were unanimously elected to serve for one year, or until their successors are elected.

Some very interesting talks were made by R. H. Polk, S. L. Pake, J. B. Shannon and others.

In order to increase the membership and for the good of the Independent telephone interests of Mississippi and western Tennessee it was decided to invite all the Independent telephone people of western Tennessee to come in and thereby make a strong association. It is believed that every Independent telephone company in western Tennessee will join, as many of them have already expressed their desire to do so.

Among the manufacturers and supply companies represented at the meeting were the L. M. Ericsson Telephone Manufacturing Company of Buffalo, N. Y., the Wesco Supply Company of St. Louis, Mo., the Automatic Electric Company of Chicago and the Electrical Supply Company of Memphis, Tenn.

Representatives of these concerns were requested to address the association. W. H. Hannan of the Automatic Electric Company responded with quite an interesting talk, explaining how the automatic apparatus worked and what companies were now using it.

H. P. Dixon of the L. M. Ericsson Company made an address explaining the company's apparatus and requesting members of the association to call upon this company when in trouble, as it maintained an information bureau for the benefit of its patrons.

W. W. Moore of the Wesco Supply Company addressed the association and announced that the company had established a branch office in Birmingham, Ala., and that it would try to fill all orders from the southern territory from this office.

At 12:30 p. m. an enjoyable luncheon was served in one of the private dining halls of the Gayoso hotel, with the compliments of the Memphis Telephone Company. R. H. Polk, general manager of the company, proved a genial and entertaining host.

Under the auspices of the Memphis Telephone Company and the Electrical Supply Company of Memphis the visitors enjoyed several hours' ride in one of the Memphis street railway's special cars, visiting all points of interest in and around the city. Refreshments were served aboard the car and the association was treated to a general good time, taking up the entire afternoon.

At 6 p. m. the executive committee went into session for a few minutes to consider the time and place of the next meeting. It was decided to hold the next regular meeting at Meridian, Miss., on December 29.

A much larger attendance was present than was expected for so new an organization and much interest was shown by all present. It is the general opinion that by the next meeting in December every Independent company in Mississippi and western Tennessee will join the association and a special effort will be made by S. L. Pake, as well as the other members, to have all the Independents represented at Meridian in December.

Those desiring to become members may communicate with S. L. Pake, secretary, Okolona, Miss.

WIRELESS DEVELOPMENTS.

A FREDERICK COLLINS has been conducting a successful test of his wireless telephone system in Newark, N. J., wireless telephone messages being successfully transmitted and received between that city and the forty-first story of the Singer building, in New York. The messages were sent from the laboratory in Newark, from phosphor bronze radiating aerial wires strung about ninety feet above the ground, and were received in the tower of the Singer building, at a height of 612 feet, a thin aluminum wire catching the wireless waves and converting them into electric currents of high frequency, which were impressed upon the receiving apparatus.

The test was considered to be conclusive and satisfactory, the words being distinct and conversation continuous and perfectly normal.

The sending current was received from the public service corporation at Newark at 500 volts. This was converted into 5,000 volts by apparatus of special design and further transformed by Mr. Collins' device into a current of enormous frequency and exceedingly high potentiality. This current, generated and maintained by the special system, was transferred to the bronze wire which discharged it and was taken up by the wire in New York, which stretched from the flagpole on the Singer tower down to the twenty-fifth story. The other pole at the receiving station was grounded into the copper sheathing of the Singer dome.

At about the same time a representative of the Radio-Telephone Company of America was looking over the field in Norfolk, Va., with a view to establishing a wireless station there, and reports are at hand that Thomas E. Clark, of the Clark Wireless Telegraph-Telephone Company, of Detroit, has perfected instruments which place the wireless telephone in practical and commercial use. The Clark wireless telephone has been placed in operation in connection with the Clark wireless station, and the new steamer, City of Cleveland, one each trip in and out of Detroit, is in communication with the Detroit station to a talking distance of twenty to twenty-five miles.

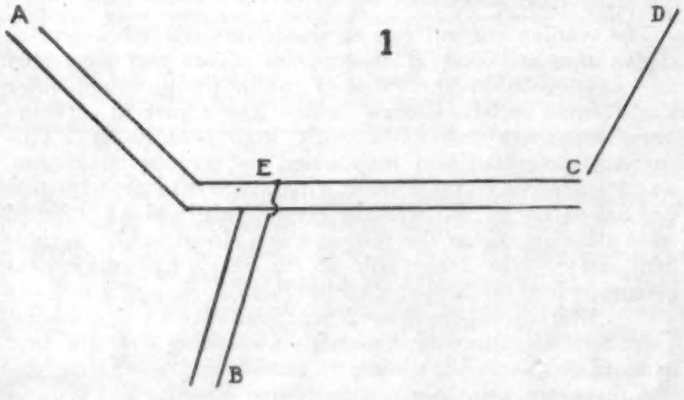
Elias Willits, of Aledo, Illinois, adopted a peculiar method of collection for telephone service recently. After notifying his subscribers that when their dues were paid service would be resumed, he closed his telephone exchange. One day was enough, and Mr. Willits collected.

Questions AND Answers By H. P. Clausen

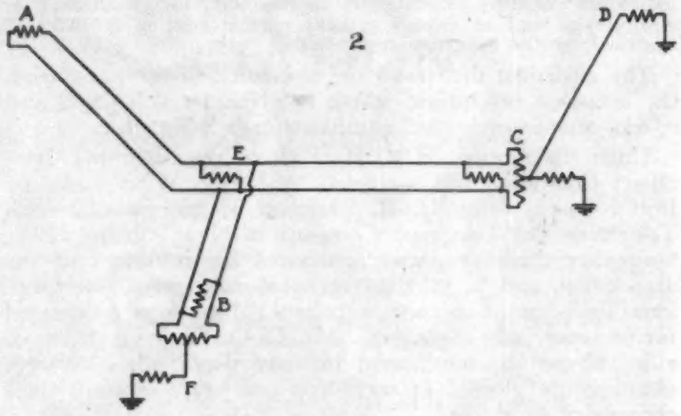
GROUNDED PHANTOM CIRCUIT OVER METALLIC TELEPHONE LINES.

I HAVE a metallic circuit consisting of No. 12 iron wire, connecting points A, E & C. There is also a station at B connected to the main line by a metallic circuit of No. 14 iron wire. I wish to establish a phantom telephone service between B and D, the circuit from C to D to be of the single wire type, using the earth as a return circuit. Can this system be arranged so that it can be operated without interfering with the operation of the present lines?—A. E. H., Indiana.

A phantom telephone service can be established between points B and D by supplying a special coil at points B and C, this coil being so arranged that when it is connected across a metallic circuit, current passed from the inductive center of the winding will pass to each line wire in equal quantities through the windings of the retardation coil connected across the line, and in this way provide a non-inductive path for the phantom currents. Diagram I shows an arrangement of the exchange and Diagram 2 shows the general circuit arrange. At A we have the line drop windings, as well as at B, C, D and E. In addition to the line drop, however, B and C are supplied with a special coil above described, and the phantom circuit is shown at F, while the grounded line branch of the phantom circuit connects to



the coil at C and of course extends through to the telephone D in a well understood manner. This phantom circuit therefore utilizes the main line wires of the metallic telephone system, and the earth return system as explained. As respects the question of operation with both line wires of the metallic circuit of the same resistance and having the same insulation towards the earth, the operation should be comparatively satisfactory. It is of course understood that the usual earth currents will still cause trouble the same as would be the case were a simple grounded lead extended from B to D. Another point which is liable to cause trouble is that when operators at the different exchanges signal over the metallic system they introduce noises upon the phantom circuits if the signal current generating equipments at the exchanges are not entirely clear from all earth connections. This practically calls for a transformer so that the ringing current projected over the metallic line from the exchange is absolutely clear from grounded connections. It is readily observed that in signaling over the metallic line from a grounded generator, it is necessary that the ringing current must pass through the phantom stations, and not only cause interfering noises when a conversation is be-



ing carried on but also operate the signal receiving device belonging to the phantom circuit. There are a number of different methods for equipping switchboards with the necessary circuits, and the correspondent is referred to several very able articles which have, and are about to, appear in the columns of TELEPHONY.

INSTRUMENTS ON A WIRE CHIEF'S DESK.

In equipping an exchange with a wire chief's desk, we would like to know whether it is best to install a voltmeter or a Wheatstone bridge, and also whether it is not best to have both of these instruments upon the desk.—R. T., Iowa.

If your exchange is of the common battery type, then it is necessary to have a high resistance voltmeter for testing purposes. You will be called upon to measure insulation resistances of local lines and in addition it is very convenient to have a means for determining whether a common battery line circuit is open or closed. It will be understood that by charging the condenser of the subscriber's telephone and receiving the discharge through the voltmeter, a characteristic throw of the voltmeter indicator will be produced, serving as a very reliable indication at least that the line circuit is closed through the subscriber's telephone and that the condenser of the telephone is not short circuited. With experience one learns to judge the probable condition of the circuit by observing the condenser kicks obtained as explained above. If you are operating a magneto exchange, when the Wheatstone bridge may be of somewhat more importance than the voltmeter, but when it comes to making any sort of a reliable measurement of insulation resistance, it cannot be done as satisfactorily with a Wheat-

stone bridge as with a voltmeter having say 15,000 ohms resistance. Finally, however, it may be suggested that a common battery exchange of any magnitude, say over six hundred lines, should be equipped with a voltmeter as well as with a Wheatstone bridge. A local battery exchange wire chief's equipment may be fairly satisfactory with a Wheatstone bridge, but of course more satisfactory if a voltmeter is also installed. These two pieces of apparatus should form a portion of every wire chief's desk.

CLEARING OUT THE DROPS IN TOLL BOARD CORD CIRCUITS.

I am about to install a new cord circuit in my toll board, and am rather in doubt as to whether it is not best to provide the cord circuit with special monitoring or listening in keys, omitting the clearing out drops. That is to say, when a toll connection has been completed, the operators are expected to listen in upon the connection frequently, instead of depending upon a clearing out signal. Are there any objections to this plan?—E. B. S., Ohio.

You evidently believe that the elimination of the clearing out drop will give you a great improvement in the transmission. This is true, or rather noticeable, only when you are working exceedingly long lines. The advantages of leaving the circuits as clear as possible are of course obvious. Practically, however, it is thought you will find it very inconvenient to operate the toll board with no clearing out drops in the cord circuits, for with such an arrangement and an operator kept pretty busy, which sometimes happens, a through circuit is tied up for minutes at a time simply because the toll station cannot be raised from another station until the operator happens to listen in upon the line and finds the connecting parties are no longer talking. Therefore, as a general proposition, install clearing out drops in the toll board cord circuits, and in order to prevent any great loss of current, the drop may be wound to 1,000 ohms or over.

A SPECIAL SERVICE CONDITION.

Having a farm line with ten telephones connected to the circuit, and one of these stations arranged for pay station service, I find it difficult to prevent telephone users at the pay station from taking advantage of the fact that no coin box is installed at the station. Whenever any one calls from the pay station a charge is made against the party in whose store the telephone is installed, while the remaining telephones upon the line are not required to pay for a connection. Is there any way that can be devised for preventing telephone users at the pay station saying they are located at one of the farm telephones?—J. S., Wisconsin.

It is rather difficult to see why the owner of the store will permit any one to use the telephone without special permission or at least requiring the customer to pay before using the telephone. However, if you will install a simple battery buzzer and push button across the battery at each of the farm telephones connected to the line, then whenever any one calls from the telephone connected to the line, request them to press the button before you give the connection. When the button is pressed the buzzer of course will operate and the operator will hear it, but should it happen that no such button has been installed, no signal can be produced, which fact will then serve as an indication to the operator that the call should be charged to the pay station.

ADDING PLATES TO AN OLD STORAGE BATTERY.

It is necessary to increase the capacity of a storage battery, and information is wanted as to the best way to go about installing the plates. Please give such information as will permit taking care of the work in a satisfactory manner.—L. S., Missouri.

Whenever a storage battery must be increased in capacity, it is always advisable to assemble the old plates of the battery together and make new cells up from the new plates. That is to say, it is not good practice to install a new plate in a tank together with old plates. Unsatisfactory results are generally obtained.

RAILROAD TELEPHONES.

OF the twenty thousand telephones said to be now in use on the railroads of the United States, the Pennsylvania lines claim more than half. Three years ago the figure seven thousand would have covered the total number for the country. Nor is dispatching the only use to which these instruments are put. At Altoona, Pa., one of the largest division points on the Pennsylvania railroad, 525 telephones have been installed by the railroad company in the residences of their trainmen. These sets are connected four on a line and are handled by one operator at the company's private branch exchange. This installation does the work of fifteen call boys, and has been found more satisfactory in every way, and also more economical. Some roads have portable telephone sets on their wrecking trains so that connection may be established with telephone circuits along the line, or if these are not available, with composited telegraph lines.

The largest user of the telephone for block signal purposes is the Atchison, Topeka & Santa Fe, which operates block signals on one thousand four hundred miles of line by telephone exclusively. The Burlington is operating about one thousand one hundred miles and the Illinois Central about eight hundred miles of line in the same way. The New York Central has for nine months used the telephone for transmitting train orders on its four-track line between Albany and Fonda, forty miles, and there have been no interruptions to the telephone service.

It is reported from New Haven that the New York, New Haven & Hartford Railroad Company intends to substitute the telephone for the telegraph in the dispatching of trains. One of the causes given for the change is that the railroad company has to pay toll to the telegraph companies for leased wires, while it owns its own telephone system.

The Illinois Central railroad has recently taken up the work of operating all its trains by means of the telephone and the officials of that road believe that it can be done more expeditiously and with more safety to the crews and passengers. The work of installing the telephones on the Cherokee and Omaha divisions has been going on for some time.

The Chicago and Northwestern railroad has installed a telephone between Chicago and Janesville, a distance of ninety miles, and is now using the telephone for dispatching trains between Chicago and Baraboo, a distance of 166 miles. By October 1, 122 additional miles between Baraboo and Winona will be in operation. The company also has a general service telephone between Chadron and Rapid City, Neb., a distance of 130 miles.

The Burlington road, which is the pioneer in telephone operation, now uses the telephone from Clyde, just out of the city limits, to Savannah, a distance of 364 miles. Telephone systems will soon be opened between Omaha and Lincoln; between Plattsmouth and Omaha, and between Plattsmouth and Ashland, covering fifty-five miles of road. Telephones are also used between Oregon and Foreston, twenty miles, and between Shabbona and Sterling, thirty-five miles.

The Rock Island is getting ready to operate its trains by telephone between Chicago and Iowa City, over 336 miles of track; between Topeka and Harrisburg, over eighty-two miles of track, and between Slater and Muscatine, a distance of twenty-eight miles.

The Missouri, Kansas and Texas Railroad Company has installed telegraphones, sometimes called composite telephones, in the offices of General Superintendent T. S. McDowell at Dallas and the offices of the superintendents at Greenville and Denison. The system is so arranged that the officials are enabled to talk to each other over the wires at the same time the telegraphers are sending messages.

The state of Indiana has one telephone for every ten inhabitants, and four Independent telephones to every Bell.

Telephonic Reminiscences

By C. E. McCluer

[Fifth Installment.]

IN THE state of telephonic art at the time of which I write, the tyro frequently ran against conditions and problems that taxed his intelligence and ingenuity to their fullest extent, but which in these days of telephonic progress and experience are mere matters of course, the same or similar problems having been repeatedly met and solved since those days, under many and varying conditions. The following recital, therefore, may seem tame and uninteresting to the experienced telephonist. But I am writing mainly in the hope that the inexperienced man may learn how such cases have been handled in order to secure the best result with a minimum expenditure of time and money.

The first Law multiple board of the Richmond exchange was gradually filled up and another and larger board, as well as more commodious quarters than those afforded by the fourth floor of the old Hannewinckle building, became a dire necessity. So other quarters were secured on the second floor of a comparatively new building on the opposite corner, a 2,400-wire board was contracted for and the new operating room fitted up for its reception. The cabinet and metal work of the new board was executed in New York, I believe, and it was shipped to us in sections which we had to assemble and wire in the new operating room. We were allowed by the manufacturers and our executive officers about six weeks in which to connect up and install the board, but accomplished the task in less than half that time. New office poles were erected and new cables "legged" in to the new board with "half" connections to the old wires so that the transfer of service from the old to the new board was made almost instantaneously. At 6 p. m. on an appointed date, one-half of the operators left the old board and operating room in the Hannewinckle building and took their regular positions at the new board across the street; and at a prearranged signal and in a prearranged manner the various working circuits were opened in the old and closed in the new operating room, the existing connections on the old board were duplicated on the new board, and the service was taken up on the one just where it had been discontinued on the other, without interrupting the conversations that were being carried on. In a few moments the remaining operators having deserted their positions at the discarded board, joined their companions, and the stream of business flowed again normally and without a ripple, not a single subscriber knowing when the change was made. The first intimation the subscribers had of the transfer to the new office and board was through the local papers of the next morning, and many of them would not believe the hitherto unheard-of task had been accomplished, until they visited our new quarters and saw for themselves. This was a bigger and more complicated task even than the removal of the Lynchburg telegraph office, but its success, without either night or Sunday work (and that is what I desire to emphasize), was due in great measure to adequate foresight and judicious disposition of means to secure desired results, and to the efficiency of my corps of carefully trained subordinates.

It is common for telegraph and telephone managers to think that such enterprises cannot be accomplished without night and Sunday work on the part of their subordinates. That is a mistake. I invariably relieved my subordinates from over work, especially on the Sabbath, whenever it was possible to do so. Hence I spent much time, mostly at night, planning how to accomplish such tasks during ordinary business hours without interruption to the service. My maiden experience in the removal of the Lynchburg telegraph office a distance of four or five blocks without interruption to the service over the important New York and New Orleans "quad" circuits, and the removal of the Richmond telephone exchange as related above, convinces me that with proper regulations and preparations (usually quite inexpensive) such tasks can be successfully accomplished without night and Sunday work as readily as with it, especially when the workers are to receive no additional compensation for the overtime. It requires only thoughtful consideration of the object sought to be accomplished, the obstacles in the way, the best manner in which to overcome them, and the reduction to writing of a program, with rules to be observed by everybody concerned in the task.

I did not have more than a half dozen young men of limited experience as my regular helpers, but I was authorized to employ as many additional men as were necessary. The twelve sections of the horizontal or flat board were screwed together and it was set up on edge in careful alignment with the position it was to occupy permanently, by the regular employes of the exchange, linemen and inspectors, just as they could be spared from their regular duties without detriment to the service. But while that was being done I gathered together a corps of inexperienced young men whom I carefully drilled in the duties I expected them to perform eventually. They were taught how best to strip the insulated gas fixture wire with which the board was to be wired, how to handle screwdrivers and the clamping pliers that had been provided for the purpose of clamping the wires to the thimble-connectors, and were drilled in all the movements they would be required to make, and in the order in which they were to occur.

When the framework of the board had been put together, and the rubber thimble-plates with their multitudinous thimbles and connectors had been properly and securely seated in their respective positions, I had a long work bench roughly constructed out of wide pine boards smoothly planed on one side, and a little in excess of the entire length of the twelve sections of the switchboard, and erected parallel to and only a few feet from the latter. On this bench I measured off the proper lengths to allow in the wires for the distances from the connectors of one section to those of another, and the entire length of wire that would be necessary to reach from section number one at the head of the board, to section number twelve at the foot. Then one man for each of the twelve sections was placed at the work bench, and one at each end to handle the wire direct from the reel. The reel-man would pass the end of the wire from the reel to his assistant at the other end of the bench, the two meeting at the middle and the second man carrying the end of the wire to his length-mark. The reel-man returning to the upper end of the bench at the same time, would draw the wire tightly on the bench and

cut it at the total length-mark. The moment the wire was stretched along the table, the twelve section men, each at his own stripping mark, would proceed to strip the insulation a distance of half an inch, precisely at the place indicated by the mark on the bench. The instant the last or most tardy worker completed his part of the task of stripping, the reel-man would give the word, and the twelve men would each raise the wire at the place bared by him, pass it over his head, turning at the same moment towards the switchboard, and with fingers and pliers would double the wire at the middle of the half-inch bare place, insert the doubled wire in its proper connector and clamp it home with his connecting pliers. He would then turn again to the work bench, on which by that time would have been laid another wire ready to be stripped, when the same routine would be repeated. At first I gave the order for each movement, just like a drillmaster putting a parcel of raw recruits through the manual exercise; but by the time they had connected up fifty thimbles each, they had become so expert that it was not necessary to prompt them, and I allowed them to regulate their own movements. Rarely was there a moment's delay on account of any one man, but they acted with soldier-like precision in all their movements, and made unexpectedly rapid progress. The 2,400 thimbles on each section of the switchboard meant twelve times that number on the combined twelve sections, or a total of 28,800 thimbles to which 2,400 separate wires had to be connected. It seems ridiculous to mention this at this day when such connections on modern metallic circuit boards in the big cities approximate millions, but in those early days of the infancy of the telephone 28,800 connectors on a board for the accommodation of 2,400 subscribers was considered a big thing.

One might think from the rapidity with which the work was done, and the raw labor employed, that many errors would have been made, and many defects found in the wiring after the job was completed. But there were not more than half a dozen mistakes made by the young men in connecting to the wrong thimbles, and those were quickly discovered and readily corrected; and when the board was finally tested out, there were only two or three thimbles that tested "open," and not a single one that tested "crossed." The open thimbles were easily closed, the additional special wiring for local purposes was accomplished and the board finally inaugurated ahead of time, without a hitch or a defect that I can recall.

Before the change in location and board had been effected, however, the exchange had begun to suffer from fugitive currents from the recently installed and rapidly extending electric lighting systems, arc and incandescent. The disturbances were scarcely noticeable at first, but as the electric plants grew and the arc lights were multiplied, the leakage began to interfere quite seriously with the night service of the exchange. The arc light circuits were first installed in the northwestern or residence section of the city, and we soon began to receive long and oft-repeated complaints from our patrons in that quarter. Then followed the introduction by the same corporation of the incandescent lamp service with its intrusive alternating current, which proved still more disastrous to telephone interests. I was not long in arriving at the conclusion that we would be compelled to adopt metallic circuits and cut loose from old mother earth or see our service ruined beyond remedy.

To add to our perplexity, a young naval officer, Lieutenant Sprague, turned up in Richmond about that time with an application to the municipal legislature for a franchise for the pioneer electric street railway system of the country, if not of the world, which was to parallel our main lines of poles and wires from the eastern to the western confines of the municipality. Being backed by abundant capital, Lieutenant Sprague readily secured the coveted franchise and the construction of the new railway system was immediately begun under his industrious and stirring supervision. This enterprise, by reason of the proposed utilization of the uninsulated rails as the common return for the powerful dynamo currents, bade fair to render our grounded telephone circuits utterly worthless. I reasoned that if the lighting circuits which were carefully insulated from the earth gave us so much trouble and inconvenience at night while they were in use, what would the leakage from the uninsulated railway return do for our day service? The night service might stand the interference as long as the telephones were utilized to a comparatively small extent, but multiply that interference twenty or thirty fold and let it affect the day service during active business hours, and I could see nothing but disaster ahead of us.

I corresponded with our executive officers in New York in strenuous advocacy of the immediate adoption of metallic circuits as our only means of salvation. But that would involve a heavy outlay for increased pole capacity and additional cables, as well as for a metallic circuit switchboard, and hesitation and delay were the order of the day. The broaching of Lieutenant Sprague's electric railway scheme, however, wakened our executive officers, and they finally concluded that something had to be done, but just what they didn't exactly know. I was called on for an approximate estimate of the cost of applying the ordinary two-wire metallic circuits to the Richmond exchange. As nearly as I could figure it out, I told them it would cost between $75,000 and $100,000, if it was done properly and with a liberal allowance for immediate growth, which I was confident was coming. That was a stunner to the conservative Western Union owners and officials, and they lay on their oars and cogitated.

During the interim I began to theorize. My memory carried me back to my Lynchburg telegraphic aurora borealis and telephonic long-distance musical experiences as heretofore related, and those experiences came to the surface and were skimmed off with the ladle of thoughtful consideration, and were ultimately developed into my "common return" theory. In communing with myself I inquired why, if my theory that old mother earth does offer an appreciable resistance to the propagation of electric impulses, would it not be possible to provide a substitute for the earth; some kind of an artificial ground for the telephone circuits that would enable us to cut loose entirely from the troublesome old dame? The idea rankled in my mind for weeks, during the limited time I could devote to speculation. I was too busy to experiment and I therefore took it out in theorizing. The more I pondered on the subject the more strongly I felt inclined to believe that my theory was correct and the conclusions based thereon were sound. Still, I could not divest myself of the suspicion that my proposed remedy for the evils of leakage was so exceedingly simple that it must have occurred to some far abler electrician than I could claim to be, who possessed more leisure time to devote to experiment than I could command, and had tested it and found it wanting.

I was therefore inclined to favor the introduction of the two-wire system at Richmond, and so expressed myself with the assertion that it seemed to be the only hope for the redemption of our exchange service. That opinion was evidently shared by our executive officers, as our general superintendent and myself were soon required to make an inspection of the metallic circuit multiple Law board recently installed in the Philadelphia exchange. After a careful investigation I was compelled to express an opinion not at all favorable to the Philadelphia board as then constructed and operated, but I saw quite a number of details that I thought could be greatly improved. I did not feel at all enthusiastic, however, over the prospect of having such a board to install at Richmond. Finally, about the time Lieutenant Sprague's franchise for the Union Passen-

ger Railway was accorded by the Richmond legislature, I was instructed to join our general superintendent and the two district superintendents from Charleston and Atlanta, on a trip to St. Louis to inspect a new Law multiple metallic circuit board that had just been introduced in that exchange. It was one night while seated in a sleeping car *en route* to St. Louis that I for the first time gave voice to my common return theory. The conversation turned upon the deleterious effects of the so-called induction from strong current systems on our exchange telephones, and we finally agreed that there seemed to be no other course for our company to pursue than to introduce the regular metallic circuit systems so urgently advocated by the Bell telephone people, with all their serious disadvantages and great expense. We all thought it would almost bankrupt the company, or force the adoption of the heroic expedient of increasing our already much complained of rates. After many misgivings and much hesitation, I ventured to ventilate my ideas as to induction and leakage, and the substitution of a wire of large conductivity for the earth as a common return. I made my theory plain by diagrams roughly drawn on the backs of letter envelopes as well as I could while the car was swaying from side to side and rushing onward at a forty-mile gait. To my surprise no less than to my gratification, the suggestion struck every member of the party as both original and feasible, and they united in the urgent advice that immediately on my return to Richmond I should verify the correctness of my theory by some crucial experiments.

Their advice was followed. With a piece of straight-away lead-covered cable, such as was then universally used for grounded telephone circuits, stretched from the rear of the big Hannewinckle building to the front, I connected up four sets of telephones on two circuits, using a single number 18 wire for the direct side of each circuit. For the other or common return side I at first bunched together five of the number 18 conductors. The magneto leakage and cross-talk were, however, distinctly noticeable. A conversation carried on over one circuit could readily be heard on the other. I then added one additional conductor at a time to the bunched common return, and myself and helpers could easily perceive that the addition of each wire sensibly reduced the volume of the leakage currents. When the return wire had been increased to the united conductivity of ten of the cable conductors, the leakage disappeared entirely, save that acute musical tones could still be faintly detected by the leakage from one circuit to the other. But when the common return was increased to fifteen of the cable conductors, or when its resistance was reduced to one-fifteenth that of either of the single direct wires, no leakage whatever could be detected even by the sharpest ears. In order to be on the safe side, however, and provide for all contingencies, I have always contended that in order to secure the very best and most satisfactory result, the common return wire should exceed in conductivity, length for length, that of any direct wire to be served by it, at least twentyfold.

After thus satisfying myself by actual experiment of the correctness of my theory, I hastened to bring the scheme to the attention of our executive officers, who swallowed the suggestion with avidity, and hastily furnished me with the bare copper wire necessary to make a practical application of the device to the northwestern section of the city. By the time the wire was received, however, our telephones in that quarter had become absolutely inoperative when the electric lights were ablaze. I had the copper wire strung on the poles of the northwestern routes as rapidly as possible, attached to brackets and glass insulators located immediately below the lowest cross-arms, and with the central office end so arranged that each subscriber's wire could be quickly transferred from the earth to the common return simultaneously with the same change at the subscriber's station. Then the work of transfer was begun. And the result was magical. Every night the lines changed over during the day were carefully tested, and in every instance it was found that lines over which it was impossible to carry on a satisfactory conversation at the top of the voice, had become so quiet that a whispered conversation could be carried on with the greatest ease and satisfaction. Circuits that before gave forth, under the influence of the electric light leakage, an ear-racking din equal to that of a busy boiler shop, were rendered as quiet as the grave.

All the stations on the northwestern routes were speedily changed to the common return, to the great delight and satisfaction of our patrons in that quarter of the city. So markedly successful was the practical application of my device to that portion of the system that I was immediately furnished with the copper wire and other materials necessary to equip the entire exchange. And the task of installation was carried on with such rapidity that by the time service was inaugurated on the Union Passenger Railway, we were prepared for it, and our telephone service was unhurt.

As soon as I had assured myself of the entire practicability of my protective device, I took steps to secure a patent, adopting for it the distinctive but rather cumbrous name, "Artificial Ground and Compound Metallic Circuit System." I considered the term "artificial ground" appropriate, as it was really an artificial substitute for the earth, and I added the phrase "compound metallic circuit" because up to that time the two-wire metallic circuit was the only known relief from the evils of extraneous current leakage, and my device accomplished the same purpose by the substitution of a single wire of large conductivity in lieu of the earth as a common return, thus as it were compounding the large number of additional wires required for the ordinary metallic circuit system into a single wire. But the American Bell people were strenuously advocating, and as far as they possibly could, enforcing, the adoption by their lessees of the two-wire metallic circuits as a protection from strong current interferences, although that alternative carried with it the material and expensive changes in switchboards and rendered necessary the addition of another wire for each station. In Richmond, for instance, compliance with the American Bell requirements meant an entirely new switchboard long before the usefulness of the grounded board then in commission had come to an end, and the practical reconstruction of the entire outside plant, or the provision of many miles of twisted pair cables, as the existing poles were already filled to their utmost capacity. Such radical changes would have involved an outlay of not less than seventy-five thousand dollars, whereas my common return was applied to the entire exchange at an expense for materials and labor of not over six thousand dollars, and with practically the same result, as far as the local service was concerned. As for the ultimate effect on the long-distance service that the permanent retention of my device would have produced, I very well know the opinion entertained by the American Bell electricians. But "thereby hangs a tale" that I may narrate later; though I am afraid my "old fogy" ideas will be received with the same cheerful denunciation and playful ridicule that greeted the advent of my "common return," which was confidently denounced by the astute Bell experts as a "fake," and a "humbug," and a "back number" of monumental proportions.

AN ERROR CORRECTED.

THE article in the July TELEPHONY entitled "An Interesting Telephone Directory" was credited in the sub-title to the Columbus Citizens' Telephone Company of Indiana. The company of the same name operating at Columbus, Ohio, is the one that produced the book, and should have been given credit for its unique and valuable features.

Digest of Telephone Patents

By Edward E. Clement

890,593. System of Distribution. Armstrong. An electric railway having the catenary maintained at equal and opposite potential to the trolley wire to neutralize static induction. Application filed September 13, 1907. Patent assigned to General Electric Company.

890,695. Combined Signal and Spring Jack. McQuarrie. A spherical self-restoring mechanical annunciator drop. Application filed May 5, 1906. Patent assigned to Western Electric Company.

891,786. Telephone System. Suren. Closed box telephone for damp places containing an electrical heating device. Application filed March 16, 1906. Patent assigned to Gamewell Fire Alarm Telegraph Company of New York, N. Y.

890,850. Telephonic Protector Against Electromagnetic Effects. Duo. Combined telegraphy and telephony by means of specially wound coils. Application filed November 30, 1906. Patent unassigned.

890,908. Telephone Directory. Hunter. A rotary directory clamped onto a desk set. Application filed October 14, 1907. Patent unassigned.

891,323. Fuse. Brown. A signal made like a folding fan is held down by a spring and opens up when the fuse blows. Application filed June 13, 1907. Patent unassigned.

891,414. Thermal Cut-out. Ernst. An indicator wire having a fuse covered by a transparent insulating material with gas expansion space. Application filed April 6, 1904. Patent assigned to General Electric Company.

891,463. Electrothermal Protector. Cook. A line protector with resetting means for heat coil. Application filed May 23, 1907. Patent unassigned.

891,961. Telephone Controlling Device. Silverson. According to this scheme the switch-hook is locked except to authorized persons. Application filed November 2, 1906. Patent unassigned.

892,060. Disconnecting Device for Telephone Lines. Johnson & Smith. Line disconnect switch operated from the inside of the house by a pull wire. Application filed March 27, 1907. Patent unassigned.

892,167. Mounting for Electrical Apparatus. Launbranch. Magneto telephone in an iron box has parts detachably mounted upon a shelf. Application filed December 7, 1904. Patent assigned to Western Electric Company.

892,170. Card Index Device. Mahony. Directory holder mounted upon the transmitter, with guideways for cards and a spring clip. Application filed January 24, 1908 Patent unassigned.

893,125. Selective Signaling System. Babcock. Step by step party line selective scheme, constituting improvement on system shown in patent No. 763,351, filed June 28, 1904. The particular feature of invention is in the cord circuit. Application filed July 17, 1903. Patent assigned to Stromberg-Carlson Telephone Manufacturing Company.

893,219. Telephone Cabinet. Altick. Sound-proof both with rectangular back portion and semi-circular revolving front. Application filed November 15, 1907. Patent unassigned.

893,249. Telephony. Kitsee. Trunking between exchanges and signals therefor. Application filed September 19, 1906. Patent unassigned.

893,250. Telephony. Kitsee. Automatic trunk signaling system. Application filed August 27, 1907. Patent unassigned.

893,277. Telegraphone. Stuart. Telegraphone having means for increasing the strength of the magnetic impressions on the record and adjustment of the same to variable speed surfaces so as to get uniform amplitude of strength. Uses a pair of magnets arranged so that the sum of their effects is always equal. Application filed July 3, 1907. Patent unassigned.

893,278. Telegraphone. Stuart. Telegraphone having a battery and condenser bridged across its magnet circuit in recording and reproducing so as to reduce hysteresis losses. Application filed September 24, 1907. Patent unassigned.

893,414. Telephone Switching and Signaling Apparatus. Wray et al. Automatic trunk signaling scheme for common battery boards. Application filed July 3, 1905. Patent assigned to American Telephone & Telegraph Company.

893,586. Thermal Cut-out. Horton. Enclosed fuse with auxiliary wire with a small carrying capacity holding an indicator for the fuse. Application filed April 30, 1906. Patent assigned to Horton-Newhouse Company.

Re. 12,828. Ringer for Telephones and the Like. Hobbs. Telephone ringer having its armature hung on springs instead of pivots and supported by adjustable plates. Application filed December 17, 1906. Patent assigned to the Dean Electric Company.

INDEPENDENT TELEPHONE SECURITIES COMPANY REORGANIZATION.

ANOTHER step in the telephone reorganization project was taken at Syracuse, when the Independent Telephone Company of Syracuse was sold under foreclosure, in accordance with the reorganization plan of the Independent Telephone Securities Company. The purchaser, and the only bidder, was the reorganization committee of the latter company, composed of George R. Fuller, of Rochester; A. H. Cowle, of Syracuse, and C. H. Poole, of Utica, N. Y. The committee will turn over the securities it purchases to the Onondaga Independent Telephone Company, which was incorporated recently. At the sale yesterday Roy W. McCanne, acting for the reorganization committee, bid in the property for $25,000. The Onondaga Independent Telephone Company was incorporated recently with Syracuse as its headquarters and a capital stock of $1,500,000. Five hundred thousand dollars will be spent in improving the Syracuse system.

Manufacturer's Department

By W. H. Graffis

NEW BROWNELL TELEPHONE BOOTH FACTORY.

THE telephone field takes pardonable pride in its numerous up-to-date manufacturing establishments. One of the most modern and complete of these plants is advantageously located near the center of the field at Peru, Ind., and is devoted to the manufacture of high class telephone booths. This admirable establishment has but recently been completed and is now in full running order, giving its owner, C. H. Brownell, and his efficient manager, Charles R. Cox, exceptional facilities for producing an excellent booth at a most conservative figure. That they make the most of these facilities goes without saying, for both gentlemen have devoted years to a careful study of the field and its requirements and believe that they have not built a modern plant in vain.

The new Brownell factory is located on a triangular tract of some eight acres about one mile from the business center of Peru, and its sides are bounded by three important railroads, affording its products direct outlets to all points of the compass. The switches and trackage connecting the plant with these roads are strictly its own property, cannot be used for other purposes, insuring prompt handling and quick delivery.

Protection from fire has been a prime consideration. The buildings are of what is known among insurance men as semi-mill or slow burning construction, water barrels and sand boxes are distributed throughout, standard fire walls and automatic fire doors separate the various departments; the city water mains are on one side and a private line with a different source of supply is on the other. Hose and reels are connected to numerous hydrants, ready for instant use.

The factory is imposing and substantial in appearance. It comprises nine distinct buildings, as follows:

Main factory building 53 by 312 feet, with an ell to the north, 53 by 75 feet. This building is of brick, stone and cement, two stories high, with full basement, in which all of the shafting is solidly set in cement, so that the immense plant runs as smoothly as a modern sewing machine.

A modern office building, 26 by 62 feet.

Power house, 40 by 60 feet, which is divided into a boiler room and engine rom. This is equipped with the latest and best apparatus on the market and also contains the establishment's electric lighting plant.

Dry kilns, 40 by 100 feet, divided by fire-brick walls into four separate compartments and having a capacity of 140,000 feet of lumber at one time.

Saw mill, 30 by 85 feet, with engine room 14 by 16 feet and dust bin 12 by 12 feet, equipped with immense band saws and modern, labor saving machinery.

Warehouse, 36 by 100 feet.

Oil house, 14 by 18 feet, a half basement structure in which the oils, varnish, naptha, etc., which the concern uses are buried below the earth's surface.

Barn, 36 by 48 feet, with wagon shed 26 by 46 feet, cement floor and side walls to a height of four feet, then corrugated iron and a fire proof roof.

Buggy shed and garage, 20 by 36 feet.

All of these buildings are conveniently located with regard to their respective purposes and are equipped with every desirable convenience. Iron tramways and push cars connect the dry kilns, the saw mill, the mammoth lumber yards and every department of the immense plant so that all material can be handled quickly and easily.

The lumber yard gives further evidence of what twenty-five or thirty years of experience will do for thinking men of ingenuity. This is strikingly exhibited in the substitution for the old timber foundations under the piles of permanent concrete foundations arranged for different lengths, graded for perfect drainage, and, of course, lessening the damage from fire.

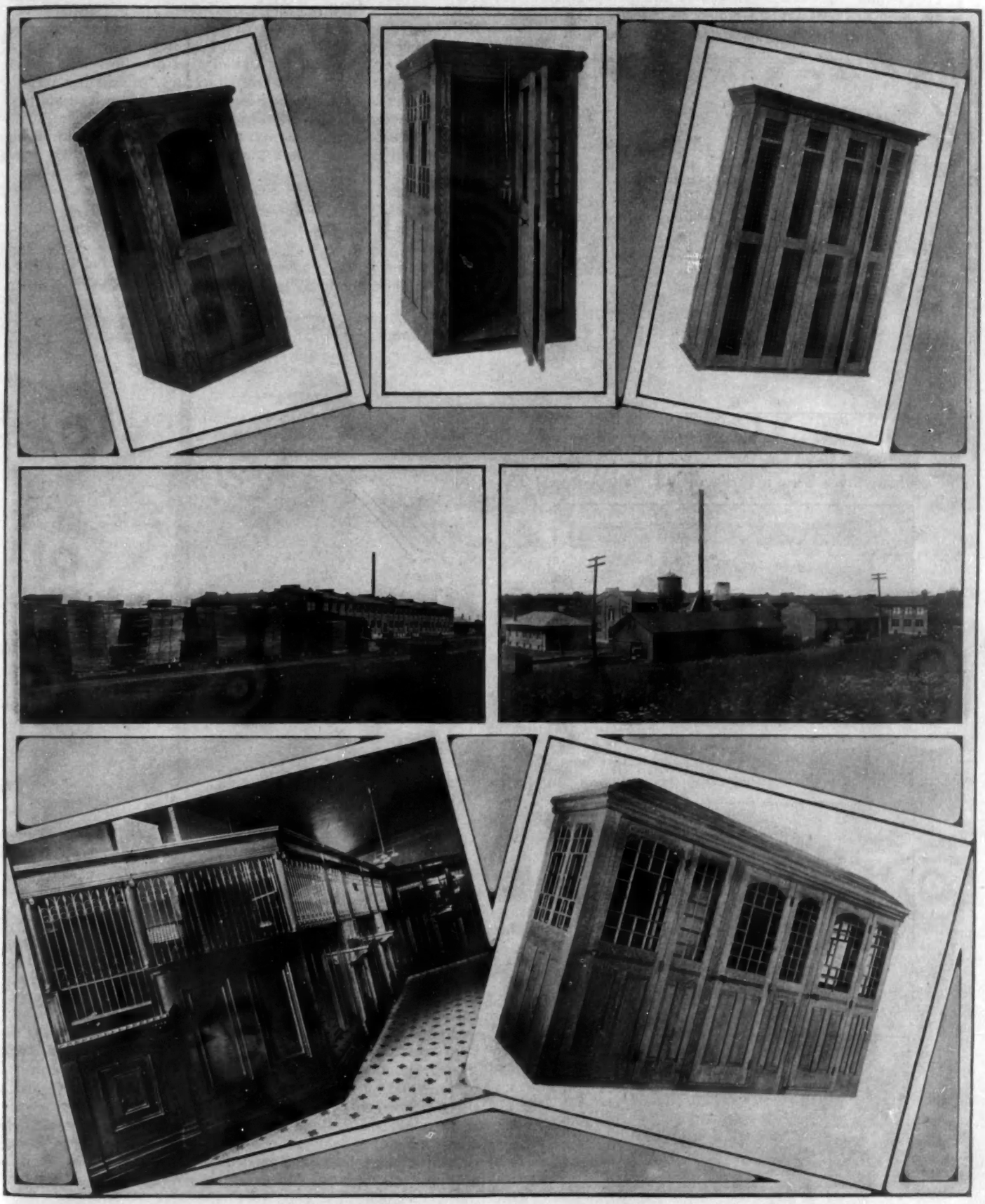
The iron tramways run down every alley, and another noteworthy feature is that these yards always contain about two million feet of carefully selected lumber constituting, in proportion to the past business of the plant, approximately a three-year full supply.

More than worthy of passing note are the systematic expert methods which prevail at this establishment, the manner in which work passes in clock-like order and with the utmost dispatch from one skilled hand to another until the finished booth is found in a large packing and shipping room, with folding doors opening upon the railroad platform.

In the manufacturing plant proper all sawdust is collected by means of an elaborate suction system and conveyed to the furnace, where it is burned and employed to generate both heat and power for the entire plant, the establishment being heated by the exhaust from the engines. The ideal condition of the plant extends to the office building as well, the furniture in this being of ornate black walnut, with ample cupboards and closets for stationery, books and supplies. Draughting rooms, private offices, retiring rooms and commodious vaults are among the other conspicuous features of this section of the plant. The kind of workmen employed has much to do with the efficiency of this establishment, none but the best being employed. The convenience, good light, fine ventilation, excellent water, steam heat, modern toilet and rest rooms also contribute their due share. But above all, should be placed the ability and experience of those who have not only been sufficiently foresighted to provide such an establishment, but are tactful enough to maintain a happy hive of cheerful industry. Apparently nothing has been overlooked which could contribute to the production of a splendid booth at minimum cost. Eleven different sizes and styles of booths are built, and they are finished in forty different colors, according to a customer's taste, or are made to order to match any special woodwork, as desired.

It will be seen that outside of telephone booths, to which the plant is specially devoted, it is fully equipped for the production of high-grade woodwork of any kind. Considerable work of this nature has been done within the past year, notably for the Citizens' National Bank at Peru, of which Mr. Brownell is president; for the Kalamazoo Trust Company of Kalamazoo, Mich., etc.

We present herewith a number of interesting views which may serve to give our readers a still clearer idea of the character of C. H. Brownell's modern plant and products.



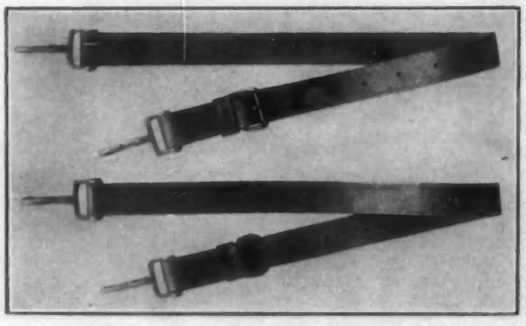
The C. H. Brownell plant at Peru, Ind., showing front and rear views of factory, and four styles of its booth products. Lower left hand picture is of cabinet work in the Peru Bank. Picture in lower right hand corner is of a booth installation at Columbus, O.

FRANK S. FEESER COMPANY.

THE Frank S. Feeser Company, Indianapolis, Ind., is one of the best known concerns catering to the telephone trade and carries a complete line of linemen's belts,

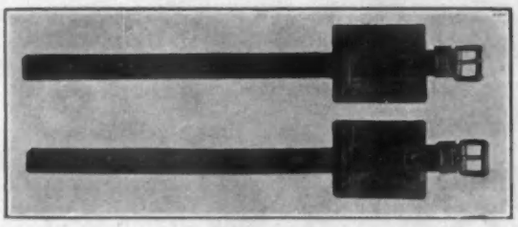
Sales offices of the Frank S. Feeser Company.

safety and climbing straps, tool bags, leather nail heads, etc. The company has been manufacturing leather goods for



Safety straps with roller snaps.

about eight years under the supervision of the most skilled workmen and only the highest grade of leather is employed



Climber straps.

in the manufacture of this class of goods. The company's factory is equipped with the most approved and carefully

Safety tool belt.

selected devices that have been developed, which is a sure guaranty of the highest class of material. The company is at present—and has been for a number of years—furnishing the largest manufacturers with its goods.

Illustrations of three of its specialties are presented herewith, together with a view of its sales office. Good material, excellent workmanship and promptness in filling orders has been the company's chief aim, and how well it has succeeded may be judged from the fact that during recent years it has been compelled largely to increase its facilities to keep pace with the demand.

The firm claims that its prices and goods cannot be equalled and invites correspondence from prospective purchasers.

IWAN'S POST HOLE AND WELL AUGER.

THE post hole and well auger manufactured by Iwan Bros., Streator, Ill., is proving to be very popular, due to its many valuable features. It is made of the best material, weighs about 24 pounds, and will take up a foot of

Iwan's post hole auger.

earth at each filling. While one man can operate this large tool, it usually requires two for working in very stiff soil, and even with an extra man it digs more rapidly, it is said, than four men can with the old-fashioned spade and telegraph spoon. As regularly furnished the hands consist of four and one-half feet of one-inch standard pipe, making the total length of the auger six feet. The auger is made in three sizes for electrical construction, such as telephone, telegraph, street car and electric light purposes, or where deep and large holes are needed. Notwithstanding last fall and winter's financial depression, this year's demand for the auger, it is said, has been very large.

The firm is especially well equipped and are widely known throughout the telephone field on account of its extensive manufacturing of hardware specialties.

It invites all who are interested in goods of this kind to correspond with it regarding samples and prices.

NEW INSULATING TAPES FOR WINDING ARMATURE COILS.

THE Massachusetts Chemical Company of Walpole, Mass., has recently placed upon the market two new insulating tapes which are designed primarily for winding armature coils, etc. These two tapes are called No. 310 and 311, the former being cut straight, the latter on the bias and allowing for corners to be turned with ease, the finished product being absolutely smooth and regular. While these goods are, as stated before, primarily designed for armature coil work, the telephone fraternity will find them invaluable when thin, extremely strong tape is required. The material calendars .011 and there are many uses to which such an excellent product may be put in telephone practice. The Massachusetts Chemical Company also manufactures No. 45 Cable Wax, which is permanently plastic and gives excellent results, it is said, in underground cable joint work.

RUBY FLUID.

RUBY fluid is a new soldering flux for all metals and possesses many interesting qualities. It is the result of scientific research in the chemical and molecular attrac-

Ruby fluid ready for shipment.

tion of metals, with a view to compounding a fluid which would act as an improved substitute for hydrochloric acid and all kindred corrosive salts, pastes and compounds, commonly used as soldering and tinning flux.

Ruby fluid is clean, without fumes, non-poisonous, non-corrosive and non-combustible, and does not attack metal or cause rust. Since the introduction of Ruby fluid many metal workers and electricians using the flux have asked for a metal receptacle suitable for carrying the fluid, and with this end in view, the fountain brush was designed, which is practical in every way, as illustrated herewith. The fluid may be used from open vessels on the bench for commutator or armature work or from the fountain brush, which can be conveniently carried in the pocket or belt without fear of loss by leakage or breakage.

Because of the great variety of work in which Ruby fluid may be used manufacturers in many lines are adopting it exclusively, it is said, thus saving the machinery, tools, stock and men employed in their works from the destructive effects of acid and other poisonous and rust-producing compounds. It is done up in neat metal cans and is shipped ready for use in that form. Ruby fluid and the Ruby fluid fountain brush, with all rights, are controlled exclusively by the Ruby Chemical Company, Johnstown, Ohio. Prices on fountain brushes and Ruby fluid will be furnished with samples upon application to C. H. Hoover, Sales Manager, Revere House, Chicago.

AMERICAN'S TWO NEW PORCELAIN CABLE TERMINALS.

THE American Electric Fuse Company of Muskegon, Michigan, and New York City has recently placed upon the market two new porcelain terminals known as types D-P and A-P. The American type D-P terminal is made with porcelain base and sides. The base is split into two halves and the side pieces are fastened to each side of the base by brass angle strips. The terminal is made in two halves, each half consisting of a base piece and side. The halves are fastened together with brass bolts, felt being used to make the junctions tight.

A new feature in this American terminal is the building of the sides in stories. A 10-pair terminal is made one story high, and a 16-pair terminal is made by adding on top of the 10 pair two six-pair sides, which makes it a 16-pair terminal. Type A-P is a 16-pair terminal. By adding two additional 10-pair sides, you have a 26-pair terminal. And so on with other sizes. The sides being in short lengths do not warp, are not easily broken in shipment or service and if any changes or additions are required, nothing is wasted or becomes useless. The American porcelain terminals are elastic and can be stretched out from a 10-pair to a 60-pair size or reduced in the same way. This simplifies the carrying of stock and parts.

The type D-P is only a cable terminal. It has no fuses or carbons. It is made in all sizes from 10 to 60 pairs and is fitted with a galvanized iron cover with a long strong chain. It has lock nut binding posts for the jumper wires, and solder clips for the cable. The base is malleable iron galvanized, and is fitted with a slot in the front through which the cable is passed so that the terminal may be wired up on the ground and then raised to its place on the pole. The malleable iron base, of course, would be set in proper position on the pole and then the terminal with its attached cable would simply be raised and set upon the base while the securing bolts fastening it to the casting are tightened up.

For wiring, the terminal is opened like a book, each side works on a swivel base, opening as much or as little as desired and swinging back in position when done. A large lead nipple is furnished for fastening cable to terminal.

It is convenient for work, very small in size, light in weight, perfect in insulation and connections, and is sold at a very low price.

The type A-P American terminal is a protected porcelain terminal. It is made up with porcelain or wood fuses as desired, and is equipped with carbon lightning arresters.

Like type D-P, just described, type A-P is made in sectional form, the bases being made of two thin pieces of porcelain, fastened on a galvanized malleable iron base. Upon the porcelain bases the side strips are mounted in sections or stories, as many pairs as desired, the extra

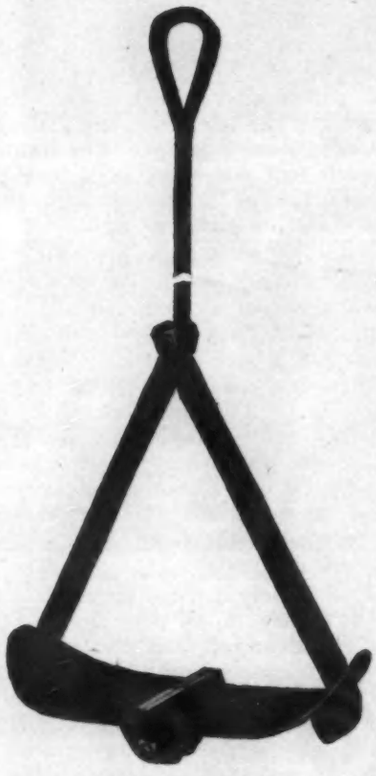
stories or sections being securely fastened together with heavy brass strips which make the entire terminal very rigid and strong.

The type A-P terminal therefore is elastic and can be made of any desired size by simply adding or taking off the extra stories. It is very compact and easy to wire, and has the slotted base casting, so that the terminal can be wired up when on the ground and then raised to its position on the casting which has previously been fastened to the pole.

American A-P terminal is fitted with American type "V" porcelain three-way fuse, and is an absolutely fire-proof protection. Sample orders will be sent to any address subject to return if not entirely satisfactory.

THE INDIANA ANCHOR.

THE Royse Electric Company of Indianapolis has recently placed upon the market a new guy anchor called the Indiana Anchor, for which it claims several very unique



Royse Electric Company's Indiana Anchor.

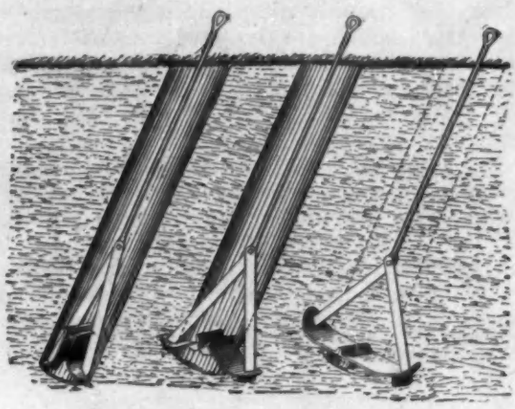
features. It is the only anchor on the market, it is said, that supports the weight from the tips instead of the center, thus enabling it to be much stronger in proportion to its weight. The company also claims that it cannot have an unbalanced resistance to the strain, regardless of the obstructions met in setting the anchor.

The accompanying illustrations present a very good idea of its appearance and the manner of setting it. No special tools are required, as an auger and a tamping bar will do all of the work.

The smallest size anchor now on the market is manufactured by the Royse Electric Company of Indianapolis, it is said, and is six by thirteen inches when opened and can be set in a six-inch hole, thus leaving almost two-thirds of the exposed surface of the anchor in undisturbed earth. The process of installing is very simple. After making the hole of the desired size and depth, the anchor is dropped in place, and with a tamping bar the wings are spread by simply striking the anchor at its highest point. The curve on the point of the wings is so designed that in spreading the wing enters the earth like a knife and does not disturb the earth except where the cut is actually made.

This anchor is made under patent granted C. H. Alyea.

Mr. Alyea has been associated with the Central Union T. & T. Company and the New Long Distance Tele-



The Indiana Anchor in place.

phone Company of Indianapolis for a number of years in their construction departments. Seeing the needs of a really good anchor, particularly one that would hold heavy strains, he designed the Indiana anchor.

During the process of properly designing the anchor, a number of them were made and installed by these companies experimentally, with the result that the Indiana anchor was reported to be the best that was experimented with. This probably comes from Mr. Alyea's experience in construction work and his intimate knowledge of the requirements of an anchor.

THE SCHUETT SELF-WELDING WIRE JOINT.

THE Schuett Manufacturing Company of Chicago is producing a wire joint that is claimed to show many decided advantages over the ordinary forms of joint. The construction of this device is such that when the wires to be connected are inserted properly into the sleeves of the joint and the joint is twisted as usual, the mere act of twisting draws the sleeve into the recess between the wires, stretch-

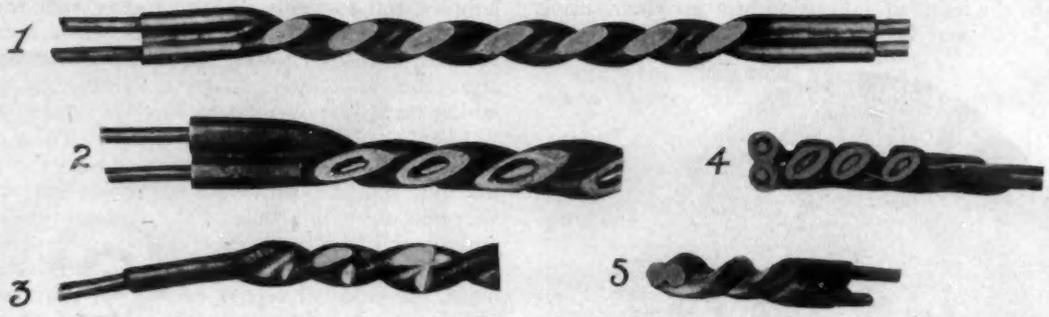
Other joints. Schuett joints.

ing it absolutely tight around both wires and making a perfect self-weld.

It is usually difficult to form a satisfactory joint between wires of different sizes. It is claimed that a combination joint of this kind may be made as well and as readily with a Schuett joint as if the wires were of the same size, provided the difference between them is not more than two gauge numbers.

Figure 1 in the illustration shown herewith represents a Schuett No. 12 joint connection a No. 12 wire with a No. 14 wire. As can be seen, a spot upon each convolution of the twisted sleeve has been filed away to expose the surface of the wires. The sleeve and wires show as a practically homogeneous surface of solid metal. As a striking contrast

the effect of the same treatment on some other makes of connector is shown in Figures 2 and 4 of the same illustration, where an air space between sleeve and wires is distinctly evident. It is claimed that when a Schuett joint is cut in two, as in Figure 5, it is impossible to distinguish the point of contact. It is plain that moisture or air cannot penetrate a joint of this kind, which insures a permanently perfect connection, which, it is said, is stronger than the wire itself.

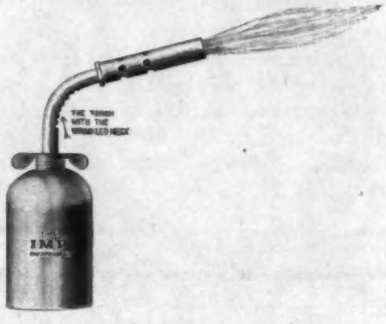


A comparative test of wire joints.

The Schuett self-welding wire joint is manufactured and sold by the Schuett Manufacturing Company, 17 West Madison street, Chicago.

A POWERFUL GASOLINE BLOW TORCH.

THE "Imp" Torch shown in the accompanying illustration is a patented device, which, it is claimed, will do as much work as most of the larger torches, with the advantage of compactness, simplicity and cheapness. It is entirely automatic in operation, has no pump or valve, needs no tools, starts with a match and gives a perfectly clean, powerful, Bunsen flame for over two hours on four ounces of gasoline. The corrugated neck increases the heating surface to such an extent that the flame of a match easily generates gas enough for starting, after which the perfectly designed mixing-tube renders further attention unnecessary. The "Imp" is sure to receive a hearty welcome from electricians, the handy man, and, in fact, from anyone who wants intense, clean heat cheaply and quickly. Interested parties are requested to write to the Frank Mossberg Company, Attleboro, Massachusetts, for further particulars.



The Imp.

"BUSINESS IS FINE," SAYS FRANK B. COOK.

FRANK B. COOK of 242 West Lake street, Chicago, recently received the following letter from the Campbellsville Telephone Company, Campbellsville, Ky.: "I desire to testify to the efficiency of your No. 10 protector as well as your protection in cable boxes. During an electrical storm this week lightning struck a building in which we had a telephone, passed over the building 30 feet, demolished the roof and jumped off on our common return and consumed (melted) the same almost from one pole to the other, but your protection kept it out of the cable. Hence they are what you claim and more, too. Yours truly,

(Signed) "G. V. MURRAY, President."

This letter speaks pretty well for the efficiency of the Cook protection, and what is accomplished in this case would be equally true of any instance of lightning striking a system, it is said, provided Cook protection was installed.

Indications still point to a prosperous finish for this year and the orders are continuing to roll in very merrily. Orders received during the past month for switchboard protection from Llano, Tex.; City of Chicago; Edinburg, Ind.; Rock Island Arsenal; Deming, New Mexico; Amarillo, Tex.; Lincoln, Neb.; Waverly, Ill.; Wallace, Idaho; Oskaloosa, Kans.; Kansas City, Mo.; Paola, Kans.; Sumter, S. C.; Glasgow, Ky.; Holton, Kans.; Richmond, Ind.; Omaha, Neb.; Stanford, Tex.; Hartford, S. D.; Burr Oak, Mich; Parker's Landing, Pa.; La Crosse, Wis.; Manchester, England; Carrington, N. D.; Higginsville, Mo.; Pentwater, Mich.; Alliance, Neb.; Sumter, S. C.; Ennis, Tex.; Tacoma, Wash.; Grand Rapids, Mich.; Hamburg, Ark.; Richmond, Ind.; Kansas City, Mo.; Rochester, Pa.; Beaver, Pa.; Beaver Falls, Pa.; Costbury, Wis.; Mankato, Kans.; Toronto, Can.

Orders for cable protection were received from the following points: Llano, Tex.; Minot, N. D.; Lumeden, Sask.; Waverly, Ill.; Malvern, Ohio; Lenexa, Kans.; Westfield, N. Y.; Capac, Mich.; Holton, Kans.; Willshire, Ohio; St. Louis, Mo.; Byron, Ill.; Crete, Neb.; Lincoln, Neb.; Eldorado, Iowa; Dexter, Mo.; Brazil, Ind.; York, Neb.; Oskaloosa, Kans.; Ohiowa, Neb.; Green Castle, Ind.; Pleasanton, Kans.; Osceola, Mo.; Stewart, Iowa; Lexington, Ky.; Wynnewood, I. T.; Davis, S. D.; Monticello, Ill.; Akron, O.; Terre Haute, Ind.; Arcola, Ill.; Newport, Wash.; Chatsworth, Ill.; Statesville, N. C.; Carrington, N. D.; Elkhorn, Iowa; Omaha, Neb.; Terre Haute, Ind.; Sedalia, Mo.; Larned, Kans.; Pittston, Pa.; Kenton, Ohio; Spokane, Wash.; Lee Summit, Mo.; San Antonio, Tex.; Du Quoin, Ill.; Fort Dodge, Iowa; Greenwood, S. C.; Oakland, Cal.; Carbondale, Ill.; Hawley, Pa.; Bridgeburg, Ont.; Dallas, Tex.; Ambrose, N. D.; Williston, N. D.; Crosby, N. D.; Tarkio, Mo.; Johnstown, Pa.; Cincinnati, Ohio; Portland, Ore.; Tyler, Tex.; Decatur, Ill.; Portsmouth, Ohio.

THE TELEPHONE PRINTING COMPANY.

AMONG the first of the Independent telephone companies to be organized was one at Defiance, Ohio, which was promoted and built in 1895 by K. V. Haymaker of that city. The next year, in 1896, he built a toll line from Defiance, a distance of about sixty-five miles, to Toledo. He was also identified with similar work in Wisconsin and Indiana.

When this exchange and toll line first began operations, Mr. Haymaker was confronted with the problem of bookkeeping, which has puzzled every company in the business. The great multiplicity of small items made it necessary to devise some system of forms and plan of bookkeeping which

would keep close and accurate account of all the business, and yet be simple and involve as little work as possible.

Being an accomplished bookkeeper, with many years of experience in similar lines of business, Mr. Haymaker soon evolved what is probably the most complete, yet simple system of books, blanks and forms which has yet been devised for this purpose. Other companies in that part of the country got into the habit of calling on him for their supply in the line of books and forms, and finally, about six years

K. V. Haymaker.

ago, Mr. Haymaker organized the Telephone Printing Company and began to solicit business by advertising and circularizing the Independent telephone companies throughout the United States. His efforts in this line met with phenomenal success. The books, blanks and forms furnished by this company have gone into every state and territory and into every province of Canada, to Mexico, South America, Sandwich Islands, and the Philippines. The rental and toll record, new form, which this company publishes, has become especially popular, and it is claimed that four times as many of this form are now in use by the Independent telephone companies as of any other that has been put on the market. The appearance of this book is shown in the accompanying illustration. By means of a short interleaf an entire year's business is carried out without rewriting the names.

This company also makes a specialty of toll tickets, and with the unusual facilities at command produces more, better and cheaper tickets, it is claimed, than can be obtained elsewhere. The company's ticket sales amounts to several millions each year. The products of this company include toll ledgers, toll journals, check reports, rent receipts, toll bills, trouble tickets, stock certificates, cash books, corporation records, card index systems, voucher checks, steel telephone signs, beside a large business in the way of special forms which companies design to fit their special needs.

The Telephone Printing Company is now designing a new system of accounting, to conform with the requirements of the new public utilities act of Wisconsin, which requires a very minute and detailed record of all items of expenditure and receipts. This system will be indispensable, it is said, to companies operating in Wisconsin, to enable them to make the detailed report each year, required by the public utilities commission, and will be found of exceptional convenience and usefulness by companies in other states, even though the law does not require them elsewhere to keep their accounts and make their reports in such detailed form.

A NEW FREQUENCY METER.

ONE of the most important factors in the successful operation of a harmonic system of selective ringing is the keeping of the various currents used at the proper cycles. The limits of allowable variations are narrow. When a multicycle ringing machine is used as a source of power for the ringing current the cycles can be found at any time by the means of a speed indicator and watch, but in cases where the ringing current is furnished by a pole changer, it has hitherto been a task of great difficulty to find out the frequencies in a practical way, due to the fact that pole changers have no rotating parts.

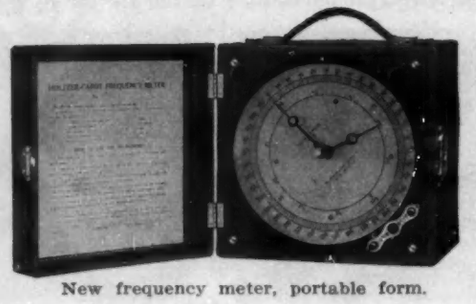
The rates of vibration of the reeds of pole changers are subject to variation by a variety of factors, such as the tension of the contact springs, the temperature, the degree of fatigue of the reeds, and numerous other causes met in practical operation. Hitherto there has been no commercial instrument available, it is said, to determine the frequencies of pole changers, and the Holtzer-Cabot Electric Co. of Brookline, Mass., and Chicago, Ill., decided to develop a practical commercial meter for this work. It has resulted in the company placing upon the market the H-C frequency meter, which is an instrument for determining the frequency of an alternating current by measurement of the current itself. The principle employed is that of counting the alternations which pass through an electro-magnet in a given

TEL No.	NAME	LOCATION	Date Inst'ld	Date Rem.	Rem. or Dis.	Rate	Dr JANUARY Cr								
							Bal	Rental	Toll and Mes	Total Debit	Date Paid	Total Paid	Rental	Toll and Mes	Rebate
		PAGE FOOTING													
		BROUGHT FORWARD													
		TOTAL FOOTING													

Telephone Printing Company rental and toll record. New form.

time, and the registration of these passages of current recorded on a dial.

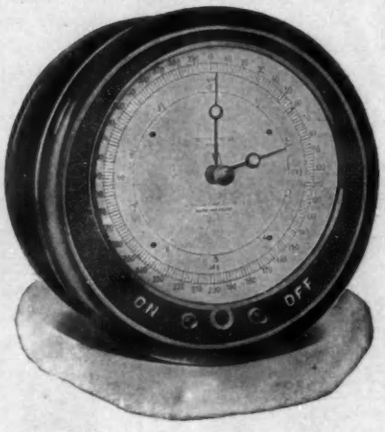
The meter will respond to currents as high as 160 cycles per second, but the meters are primarily made for harmonic party line work which in common practice to-day does not exceed 75 cycles per second. The indications of the meter are entirely independent of the wave form of the current



New frequency meter, portable form.

to be measured and also of the voltage so long as the voltage is above the point necessary to work the magnet. The minimum voltage of course will vary with the frequency, being higher as the frequency advances. From 20 to 50 volts will operate the meter at 16 to 70 cycles respectively. The meter reads directly upon the dial in either alternations per minute or cycles per second. The hands can be immediately returned to zero point after a reading has been taken.

Combined with the meter is a clock movement which is arranged to be started by a small push button which in turn closes the current through the meter. The meter is durable, simple, and accurate. The fact that it counts every alter-



Holtzer-Cabot Electric Company's new frequency meter.

nation and records it places the accuracy of the meter far ahead of any device that depends upon reeds, electro-magnets or electrical turning devices.

The meter is made in three types: portable, front of switchboard, and rear of switchboard styles. The portable type is enclosed in a rich mahogany case with appropriate trimmings and furnished with a leather strap handle. The front of board, and rear of board types are enclosed in ornamental iron cases having dark gun metal finish.

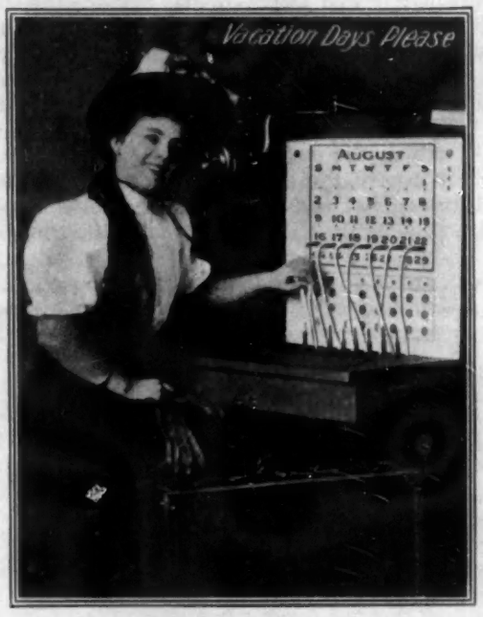
The meter is placed upon the market by The Holtzer-Cabot Electric Co. of Brookline, Mass., and Chicago, Ill.

TELEPHONE BELLS AND GONGS.

G. C. REITER, Canton, O., is known to most telephone manufacturers as one of the largest makers of telephone bells and gongs in the world. Mr. Reiter is prepared to furnish bells in pressed brass, steel or cast bell metal, from 1½ to 24 inches in diameter, and finished in nickel, polished brass and gun metal. The latter finish, which is a secret and patented process, Mr. Reiter has been testing out for several months in order to determine its ability to withstand weather and other corrosive elements. Manufacturers who want a high grade and attractive bell to go with their apparatus are asked to address Mr. Reiter who will endeavor to quote them satisfactory prices.

THE MOORE HOLIDAY CALENDAR.

VACATION days, please! Surely, this is the most attractive of all the winning calendars that Alfred F. Moore of Philadelphia sends out to the telephone people every month. Telephone men enjoy a vacation as much as anyone else—but Mr. Moore hopes they will all be so busy that it will be hard to work a holiday in edgewise.



For his holiday talk Mr. Moore simply continues upon the interesting subject of cords, as follows:

"For the convenience of our trade and to protect the cords, we pack them all in neat boxes holding 25 or 50.

"Each box is labeled plainly so that the stock can be read at a glance.

"A very important feature is that the cords may be carried in stock three months or three years without deterioration or loss.

"When taken from the boxes they are always as fresh and clean as the day they were made.

"If you will try our plan, we doubt whether you will ever be satisfied to return to the old ways."

THE PARAGON BATTERY BOX.

F. W. PARDEE, of 58 Fifth avenue, Chicago, Illinois, calls attention to his paragon battery box for telephone and electric bell work, which appears in our advertising columns this month. This battery box is of new and unique design. It is made of sheet steel, finished in black Japan and is lined throughout with heavy insulating fibre which protects the sides of the box and the edges of the holes. It has holes at the top and bottom for leading in wires. The battery box holds two standard size No. 6 dry cells and provides a neat receptacle for batteries which are generally left exposed and protected when used with desk or hotel types of local battery telephones or in electric bed installations.

Paragon battery box.

The battery box can be fastened in any convenient place and may be removed to renew batteries without taking out screws. It prevents broken connections and protects the carbons which are frequently broken when batteries are knocked over. The Paragon battery box is for

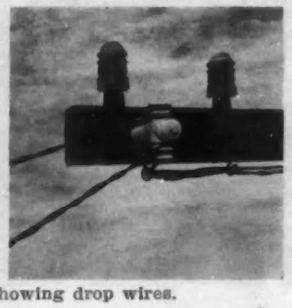
sale by all telephone manufacturers, jobbers and dealers in electrical supplies.

Interested parties are requested to write to F. W. Pardee, 58 Fifth avenue, Chicago, for further particulars.

TWISTED PAIR WIRE DISTRIBUTION AND UNIVERSAL INSULATORS.

WITHIN the past few years the use of twisted pair wire for telephone distribution has increased enormously, due to its convenience and other advantages, especially in connection with cross armless cable distribution. It soon became evident with its increased use, that to use twisted pair wire successfully, it was essential that certain precaution be taken in the manner of attaching the wire to its supports so as not to damage the insulating covering which would result in crosses between the wires of the twisted pair. It was but natural that in its early use twisted pair wire was treated like single wire but the resulting damage soon manifested itself in the nature of short circuits at the insulator, especially where the wire was under a mechanical strain which the rubber insulation was unable to resist, or a sharp bend was made in the wire, cracking the insulation.

These conditions are now generally recognized by operating companies as evidenced by various devices in use at-



Universal Insulator showing drop wires.

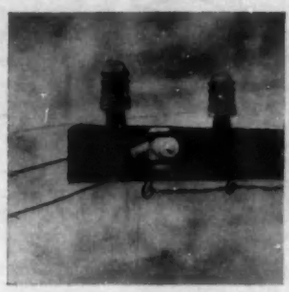
tempting to overcome the difficulties mentioned. None of these devices, however, can be considered a complete solution of the problem, which fact led to the designing of the Universal insulators. It is claimed that these solve the problem of a suitable insulator for twisted pair distribution more completely than anything heretofore in use, from either the electrical, mechanical or economic standpoint as a glance at the accompanying illustrations will make plain. It is expected that twisted pair drop wire should be capable of being taken down and used over again. Where, however, the insulation of the wire has been damaged at the insulator or point of support it makes the wire unfit for re-use, the weak insulation perhaps not being evident and

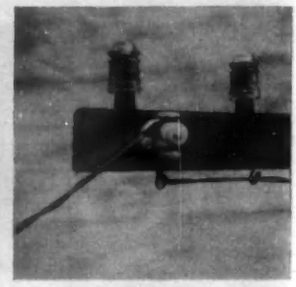
Universal Insulator No. 1002.

Universal Insulator No. 1003.

coming in the center of the span of the new drop circuit will result in future trouble and expensive maintenance. Universal insulators will prevent the wire from being damaged in the first place, and where owing to previous faulty treatment of twisted pair wire, trouble has developed at the point of support it often will be possible by replacing the old method of support with a Universal insulator to avoid the necessity of taking down and replacing the damaged drop wire. The design of Universal insulators is such as not to be dependent on the insulation of the wires at the point of support for successful operation.

Durability, great strength, simplicity, economy and convenience sum up the points of merits of the Universal insulators. The marked improvement in neatness, it is said, appeals to those appreciating high class construction, likewise the universal usefulness of the insulator which can be



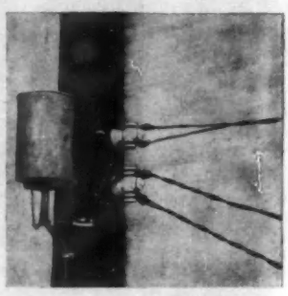


Universal Insulator on cross arms.

used as cross arm brackets, house brackets or pole brackets, reducing the variety of parts to a minimum.

The Universal insulators consist of only one piece and are made entirely of high grade porcelain thereby eliminating all chance of rot or rust. When fastened with expansion bolts all wood is done away with and depreciation is a minimum. Actual tests and practice have proven Universal insulators to be from two to six times stronger than any telephone drop wire. The supporting screw or bolt being in the center of the insulator is at the most advantageous position, the pull of the wires being balanced and always in line with the screw or bolt. High and permanent insulation is assured it is said by having a groove for each wire, avoiding all troubles resulting from two wires being in one groove. Equally suitable grooves are provided for all directions of the wire.

Interested parties are requested to write to the Universal



Some extensive applications of the Universal Insulator.

Specialty Co., 116 South Seventh street, Terre Haute, Ind., for further particulars.

THE ROEBLING MONUMENT.

ON June 30 at Trenton, New Jersey, a monument was unveiled that paid striking tribute to the great engineer, John A. Roebling, founder of the John A. Roebling's Sons Company. Practically all mercantile business in the city was suspended during the dedicatory ceremonies. Men of note in national, state, county and municipal affairs took part in the program.

Preceding the formal dedicatory program at Cadwalader Park, there was a parade of Roebling employes from the Trenton and Roebling mills. This parade was made up of 6,000 persons who gain their livelihood in the works which were founded by John A. Roebling, and every man and boy of the great marching column was filled with enthusiasm.

Every face of the granite base upon which the statue of Mr. Roebling is mounted speaks a powerful lesson. On the front face is the inscription telling the story of the erection

of the monument. On the other faces are representations in bronze of the wonderful work done by Mr. Roebling, including bas-relief likenesses of Brooklyn suspension bridge and Niagara suspension bridge, two of his greatest engineering accomplishments. The statue itself is of bronze, and is cast in heroic size. It represents Mr. Roebling in a sitting position with the familiar engineering impedimenta of drawing and scale upon his knee. The total cost of the monument was $14,000, which was raised by the Roebling Memorial Association.

The monument inscription as it appears on the base of the statue is given below:

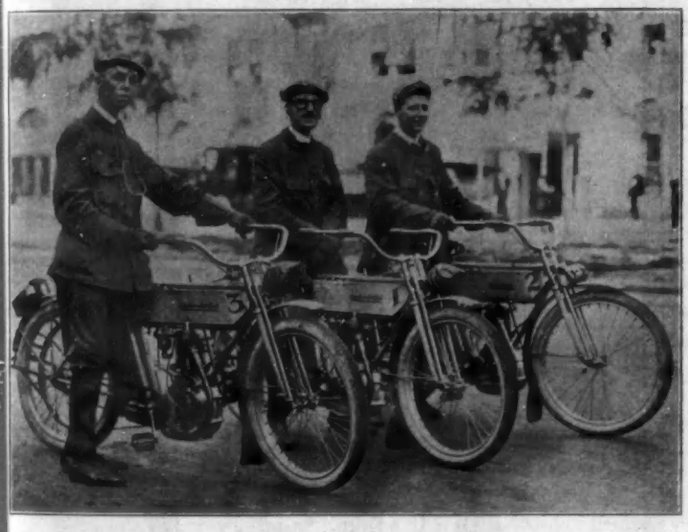
MONUMENT INSCRIPTION.

To John A. Roebling, Civil Engineer, Designer and Builder of Many Suspension Bridges, Founder of Trenton's Greatest Industry, an Energetic Worker, Inventor and Man of Affairs, Devoted to His Adopted Country, in Whose Progress He had Unswerving Faith, a Patron of Art and Sciences, and Benefactor of Mankind, this Monument is Erected by the Citizen's of Trenton and His Sons in the Year 1907.

The statue was unveiled by Mr. Roebling's granddaughter, Miss Emily M. Roebling.

A THOUSAND-MILE MOTOR CYCLE TRIP PROVES EFFICIENCY OF WELL-KNOWN MACHINE.

THE many telephone companies which have been considering the use of motor cycles in connection with their line of work will be interested in the results of two recent reliability tests. The most important of these was a run from New York to Chicago, immediately following a very severe two-day test held in connection with the meet of the Federation of American Motor-cyclists at New York City.



Waiting for the signal.

The gentlemen who arranged the route for this run evidently intended that there should be but few survivors. They succeeded probably up to their expectations.

The first day's route was from Catskill to New York City, not by the regular Albany road along the Hudson, River, but leading due west from the Catskill directly on over the Catskill mountains, which was a case of up the hill and then march down again. The up-the-hill part tried the machines; there being one rise of seventeen hundred feet, or a distance of four miles, the grade in some cases running as high as thirty per cent. The Excelsiors made it with as little or less effort on the part of the rider as any machine in the contest When it came to the descent the rider and machine were equally tried, as the grade here was even worse than on th ascending side. It was a test of skill and brakes and that the test was a severe one is fully evidenced by the fact that out of sixty odd starters only fortw-two finished the day. The brakes became heated, locking the rear wheels in some cases so suddenly as to utterly demolish the wheel, but when the day was over the Excelsiors were still there. Owing to their utter inexperience on such roads and lack of familiarity with the course, which was absolutely unmarked, the Excelsior men met with some delay and were slightly penalized on that account. The next day's route was a circuitous course, practically from end to end of Long Island, the distance being some hundred and seventy miles. The process of elimination coinued here, as some of the machines that had been able to finish the first day's run did so in very condition and were unable to stand the additional strain of the sand roads encountered in some parts of Long Island. The result was that thirty-two finished, approximately half the original starters.

The three Excelsior machines finished the second day's run with a perfect score, thus showing that hard though the former test might have been, they were equal to it. Not only did they finish, but in such condition that it was without any replacement whatsoever and with no adjustment beyond a general inspection of bolts, nuts and bearings. The same three machines left New York on the following Monday to participate in the reliability run from there to Chicago. In this run at the start were twenty contestants. With the exception of the three Excelsior machines and one oher all were new machines especially prepared for this run. This was by far the greatest and most important motorcycle reliability test ever undertaken. It included not only the ride of something over a thousand miles, but a hill-climb on Tribes Hill near Amsterdam, New York, and a gas economy test from Butler to Mishawaka, Ind. In the hill climb all three Excelsiors stood the test with no trouble whatsoever and made the long, steep ascent at a speed of twenty miles per hour and over. In the gasoline test they not only negotiated the eighty miles within the gallon of gasoline allowed for the distance, but one of them, ridden by N. C. Trumper, covered the distance on slightly less than two quarts of gasoline, the smallest quantity used by any of the contestants. The roads encountered on this run were good, indifferent and bad, and when they were good they were very good; when they were bad, they were inexpressible in polite society.

The state of New York recently passed an appropriation running into the millions for road improvements. As one rider put it, they had spent about half the money at the time the riders had to go over those roads. In many cases the route laid out was absolutely impassable and a long detour was required to reach the next control. As the time schedule was based on the distance over the direct route, it was necessary to beat it to make up the distance.

In one instance the distance over the roads specified was eighteen miles, but owing to the mountainous condition and circuitous roads at that point the riders had to travel twenty-eight miles to the next control and do it within the time specified for eighteen. That such riding was hard on the machines can be readily accepted, but the Excelsiors, despite the gruelling test of the two-day run through New York, made the trip with as little if not less contention than any other machine in the run.

Contestants were found along the road, in repair shops and at the roadside tearing down their motors to replace broken pistons, replacing broken fork stems, patching broken frames, and, in one instance, the entire cylinder was blown off the motor. Four machines that started on this run fell by the wayside and had to be shipped back to the factory. But the Excelsiors kept on going and the onlv work done on the motors of these machines was the reseating and grinding of one exhaust valve, which was done within the rider's time allowed to cover forty-seven miles, and he not only did the work but reached control well ahead of schedule time.

The manufacturers of the Excelsior auto-cycle proudly point out the record of these machines in this run as fur-

ther proof of the absolute reliability of the Excelsior auto-cycle under any good conditions.

While they missed a perfect score and the position of winning team by a loss of ten points from the three thousand representing perfection, the Excelsior auto-cycle won the diamond medal for appearance at the end of the run and the gasoline economy test. They were also the only team outside the winners to arrive at every control intact.

W. W. DEAN PRESIDENT OF DEAN COMPANY.

WILLIAM W. DEAN, former vice president and chief engineer of the Dean Electric Company of Elyria, Ohio, was elected president of the company at the last meeting of the board of directors. He succeeds Samuel B. Rawson, who died last April. The other offices were filled by the election of A. E. Barker as first vice president; Max Koehler, second vice president; T. M. Brush, third vice president, and A. G. Bean, secretary and treasurer.

W. W. Dean.

Mr. Dean's career has been interesting from the time of his entrance into the telephone field. Beginning as a trouble man his promotion was rapid, and by 1889 he had become chief inspector of the Bell Telephone Company of Missouri. In this capacity he had charge of all equipment and electrical work.

His next step carried him to South America, where he undertook the task of completely overhauling the system of the Campania Union Telefonica of Buenos Ayres. This was an extensive plant, practically covering the Argentine Republic, and capable employes were practically impossible to secure; yet he made an unqualified success of his work, and obtained results of great value.

On his return to the United States in 1891 he again became associated with the Missouri Bell company, and it was then that his first patents were taken out. His work soon attracted the attention of the Bell officials, and he was called to Boston. Later he was given charge of the experimental laboratory of the Western Electric Company in Chicago.

Mr. Dean resigned from this position in 1900 to become an engineer for the Kellogg Switchboard and Supply Company, and was soon made chief engineer.

Shortly after the control of the Kellogg company passed into Bell hands the Dean Electric Company was organized. Its success is largely due to Mr. Dean's personal efforts and to the efficient corps of employes which he was always able to gather around him.

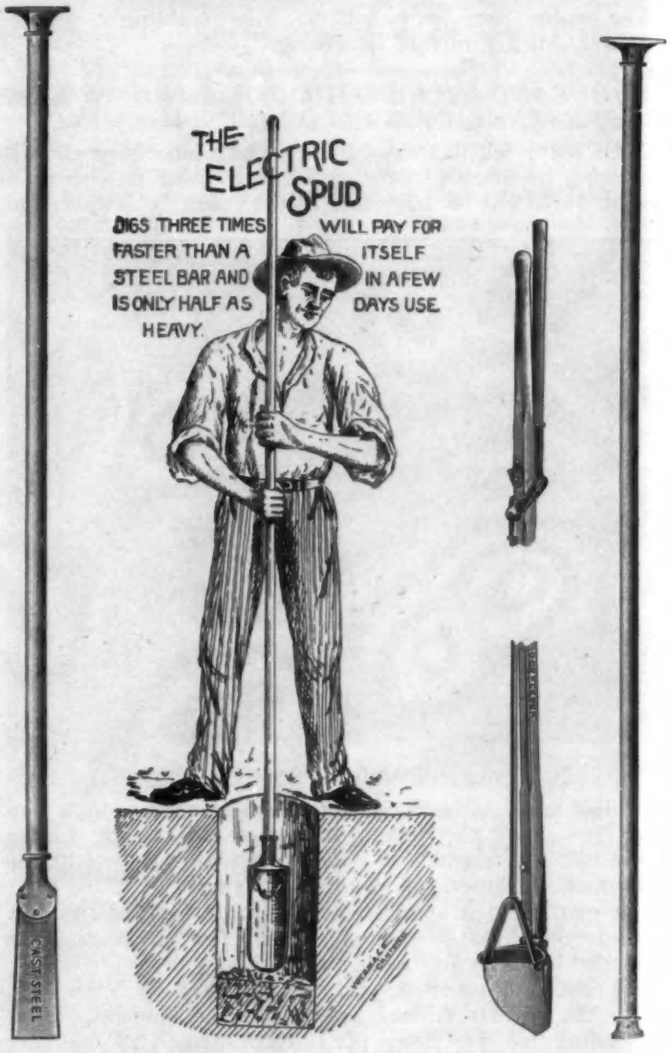
INCREASED FACILITIES.

THE General Fireproofing Company of Youngstown, O., reports that an additional factory building, 60x200 feet, will be erected at once. This building will be put to a novel use, and is an evidence of the progress being made in finding a substitute for timber, which is so rapidly disappearing. It will be devoted to the manufacture of steel office furniture and filing devices. This furniture is finished to so closely resemble oak or mahogany that the difference cannot be detected by sight alone. The steel furniture possesses advantages over wood, in that it is fire-resisting, space-saving, indestructible through use, and is not affected by moisture, which frequently plays havoc with wood furniture, causing the veneered finish to blister, and drawers to swell and stick in the cases.

PLANT AND PRODUCTS OF THE BUCKEYE MFG. CO., CANTON, O.

THE Buckeye Manufacturing Company of Canton, Ohio, requests every telephone man who has construction work to do to investigate its line of tools, embracing a spud, tamping bar and digger.

The Buckeye Manufacturing Company has been making


THE ELECTRIC SPUD
DIGS THREE TIMES FASTER THAN A STEEL BAR AND IS ONLY HALF AS HEAVY.
WILL PAY FOR ITSELF IN A FEW DAYS USE.
CAST STEEL

Products of the Buckeye Manufacturing Company.

these tools for years—in fact, furnished those which Mr. Jordan, of the Farmers' Telephone Company, employed when he built the first Independent telephone plant near Massilon, O.—and with such improvements as have been designed from time to time they easily justify the claim of "best that money and experience can produce."

The Buckeye company occupies its own three-story factory building near the B. & O. railroad station at Canton, and Mr. Charles Gibbs, proprietor and founder of the concern, gives the business his active personal attention.

Telephone construction, in these days of modern means

and methods, calls for the most approved of time and labor saving utensils. Here is where the Buckeye tools "shine."

The Buckeye electric spud, which, as shown in illustration herewith, is made in two styles—straight and concave—is pronounced one of the most efficient and satisfactory tools upon the market. The bar, or handle, is of crucible steel tubing, making it fully one-half lighter than the ordinary spud, while its interchangeable blades, made of the best mining tool steel, will, it is said, loosen the earth three times faster than a bar and without tiring the operator. On the upper end of this spud is a tamper for tamping in the earth around a pole, thus combining a spud and tamping bar in one tool.

The Buckeye company, as shown by the accompanying illustration, also makes a tamping bar as a separate tool and one of distinctive features and merit. For this tamper it is claimed that it is not only the lightest and best made tool of the kind on the market, but is much more easily worked, there being no friction on its sides. The handles are of crucible steel tubing (not gas pipe), and the ends of refined malleable iron. In fact, the entire line of Buckeye tools are built with a view to being indestructible as well as time and labor saving.

The "lock-lever" digger is designed for digging deep holes, such as are required for telephone poles. It is made in various sizes to meet different requirements and will dig any depth up to ten feet.

Mr. Gibbs first made a reputation for this digger, as well as a tidy sum for himself, by contracting with a large telephone company to dig all of the holes for a new system it was putting in at just one-half the price which the company had previously paid for such holes.

It evidently does the work and a short trial will teach any operator how it can be used with skill, both lightening and facilitating his tasks. The "lock-lever" is automatic, converting the blade from the vertical position in which it is inserted into the earth to a horizontal position, whereby it becomes more of a spoon, as it were, and thus it retains the detached earth, while the lever locks, leaving both hands free for use in lifting the earth out and dumping it. This digger will, it is said, work equally well in all kinds of soil and will take out stones almost as large as the diameter of the hole.

The Buckeye Manufacturing Company wants to get in touch with all telephone companies, contractors and dealers who need tools of the kind described, as the concern has every facility for making a superior article in large quantities and is prepared to name attractive prices. Its announcement appears regularly in the advertising columns of TELEPHONY.

STROMBERG-CARLSON POST CARDS.

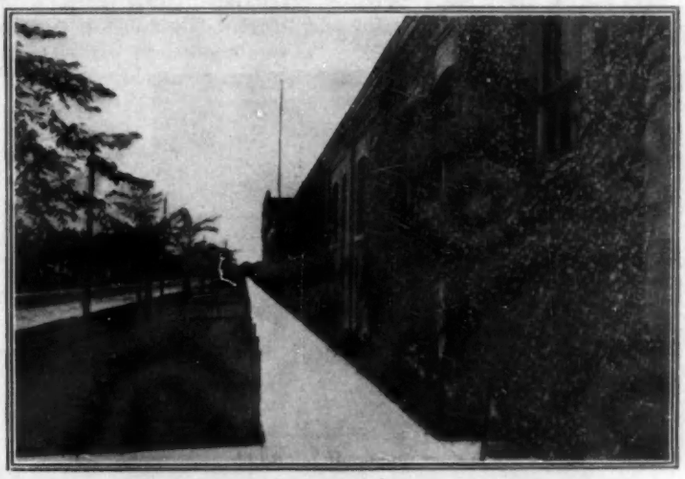
THE Stromberg-Carlson Telephone Manufacturing Company is sending out a set of four printed post cards illustrating the various buildings of the company's factory

Stromberg-Carlson main office and factories, Rochester, N. Y.

and offices at Rochester, N. Y. These are reproductions of true-to-life photographs, taken in the summer time. The grounds and surroundings look very inviting, and one is tempted to believe that the lot of the Stromberg-Carlson employes is cast in pleasant places. The well kept lawns

Stromberg-Carlson factory buildings No. 2 and 3, Culver road, Rochester, N. Y.

and trees, and the cool-looking ivy on the walls, make the place look more like some old college building than one of



View of roadway and Stromberg-Carlson factory.

the big factories of the country. The photographs are representative of all that a modern factory plant should be, and

Main office building, Stromberg-Carlson Telephone Manufacturing Company.

readers of TELEPHONY who secure a set by writing the Stromberg-Carlson Company will be well pleased.

THE DIAMOND EXPANSION BOLT COMPANY, New York, N. Y., has recently issued a new catalogue descriptive of its specialties which can be had upon application.

NEW MONARCH MAGNETO SWITCHBOARD FOR CANTON, S. DAK.

AN arrangement of mounting drops and jacks that is extremely compact and convenient is being used by the Monarch Telephone Manufacturing Company of Chicago in some of its magneto switchboards. The board shown in Figure 1 has just been completed for the Canton Co-operative Telephone Company of Canton, S. D., and illustrates the arrangement. The drops and jacks are mounted ten per strip, making it possible to install two hundred lines in each position instead of the usual one hundred and fifty. The rigidity of the panel is in no way reduced by this arrangement, the Monarch drop and jack strips being made of heavy steel and fastened solidly to a metal frame in the board. The cabinet as herewith illustrated is the type ordinarily used for four hundred and fifty lines, but owing to the ten per strip arrangement has a capacity for six hundred lines. In this particular board the toll and rural lines are installed in the third position and are multiplied in the first position for the convenience of the operators. However, the operator at the second position can handle the entire board from this position. Owing to the ease with which this can be done, for the present the Canton people

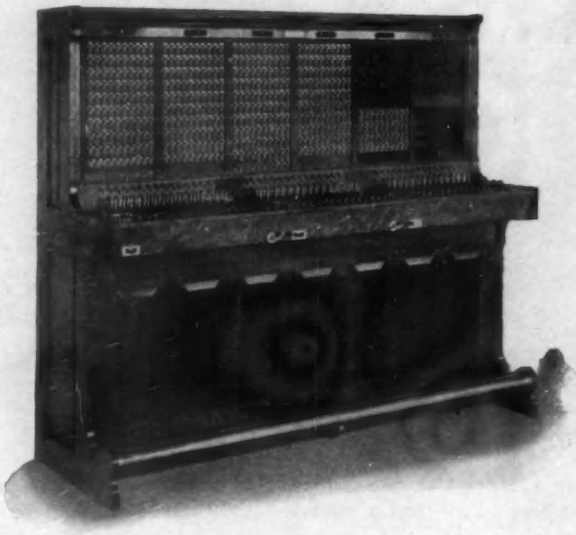


Figure 1.

intend to have the operator at the second position handle the lines in the third position as well as her own.

The key shelf of this board is shown in Figure 2, and it will be noticed that there are two clearing-out drops and two lamp signals for each cord circuit. This provides separate supervision over each side of a connection independently of the other and furnishes a clearing-out system almost as complete as that of a common battery board. The answering and calling sides of each cord circuit are separated by two ½ M. F. condensers, as in Figure 3. When one of two connected subscribers rings off, the clearing-out drop on his side of the connection will fall, while the other will not be affected, owing to the low capacity condensers, which offer a high resistance to the ringing current and keep it from passing through the other drop or out on the line. The operator seeing one of the clearing-out drops fall knows which subscriber has rung off, and if both clearing drops fall she knows both subscribers have rung off, and therefore has a positive signal to disconnect without following the usual practice of listening in to ascertain if the conversation is ended. This system is exceptionally reliable, for no matter how weak a ring-off signal may be, the arrangement of the condensers forces the entire volume through one clearing-out drop and by this concentrating its strength the chances for failure of the drop to operate are greatly reduced.

Even though the clearing-out drops have fallen and the operator neglects to take down the connection, the recall lamps make it possible for either of the subscribers to get back on the line by operating the hand generator. This

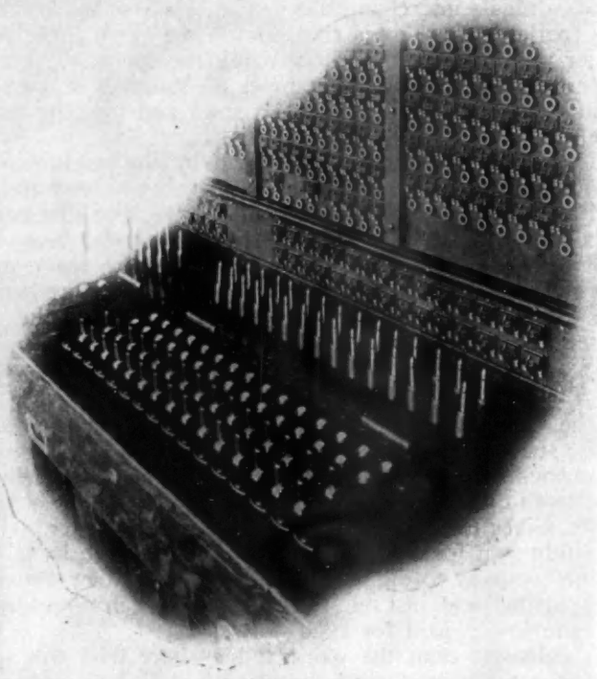


Figure 2.

draws up the armature of the clearing-out drop and, by means of a contact spring attached to the armature, closes a local circuit which lights the lamp indicating the side of the cord circuit through which the signal comes. The spring which closes the lamp circuit is so arranged that it requires no extra exertion on the part of the armature to make the contact and is just as reliable as a relay, besides being more simple and economic. With this system it is practically impossible to have a line tied up even though the ring-off comes from a bridging instrument connected with a low resistance series instrument, or if the ringing current

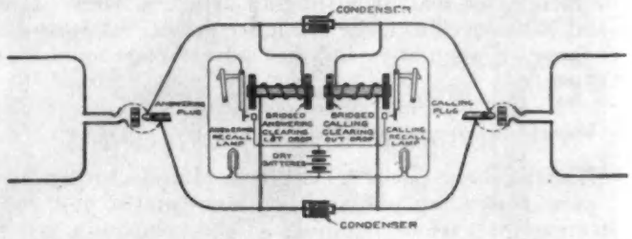


Figure 3.

is weak, or the operator neglects to take down the connection and restore the drops, or from any other cause.

The Monarch Company has just issued a booklet describing in detail this and other clearing-out systems which have been produced, and it will be sent to those interested on request.

WOOD PRODUCTS FOR TELEPHONE CONSTRUCTION.

M. F. OSBORNE & SON, of Camden, N. Y., are making a specialty of pins and brackets for heavy telephone construction work, and of all styles of thimbles for use on steel telephone and electric light pins. They also manufacture a line of wood

products which includes everything that can be turned out of wood—all styles of handles, spindles, wheels, rolls, etc.

A complete wood-working factory, capable of handling wood turning of any kind or size, is only one feature of their well-provided plant. Owning their own timber lands and manufacturing directly "from the stump," they are enabled to select the wood used with a view of marketing only the best grade of product, and the leavings and short ends are not used.

Camden is situated in one of the best lumber districts of the country; and the Osborne plant is located at the junction of two railroads. These features enable ordinary orders to be filled and shipped the same day as received.

The freight to destination is allowed on all orders received by M. P. Osborne & Son; yet, in spite of this, their prices are surprisingly low. Telephone companies and others requiring turned wood supplies of any kind will do well to secure their prices.

NEW DEAN SUPERINTENDENT.

J. F. BARBOUR, the new superintendent of the Dean Electric Company's plant at Elyria, Ohio, is a man of wide mechanical experience in the manufacturing business. An outline of Mr. Barbour's previous business connections

J. F. Barbour, new superintendent Dean Electric Co.

indicate that he is remarkably well fitted for the efficient administration of a modern shop.

His first position was with the Scoville Manufacturing Company of Waterbury, Conn. With this concern, he learned the tool making trade, and after eleven years' experience at their plant he resigned to accept a position as assistant superintendent of the Manhattan Brass Company's plant in New York City. Within a year he was promoted to the superintendency.

Three years later the Western Electric Company selected Mr. Barbour to take charge of the machine and telephone assembling departments in their Chicago shop. In this capacity, he became thoroughly familiar with the telephone industry, applying many of the devices used in his previous connection.

Mr. Barbour's appointment as superintendent of the Dean plant dates from March 15, 1908. His appointment was necessitated by the transfer of A. D. T. Libby to engineering and patent work directly under the Dean president, Mr. W. W. Dean.

BERRY LIGHTNING ARRESTER.

THE Berry lightning arrester, manufactured by the Berry Electric Manufacturing Company, Marion, Ohio, which has been on the market for the past four years, is one of the first lightning arresters designed for telephone use. It is made of brass and porcelain and is about five and one-half inches in length. The arrester is composed of two tubes, one tube inside of a larger one. The inside tube is seven-eighths of an inch outside diameter; the outside tube

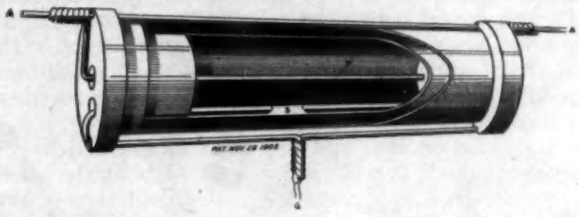


Figure 1.

is one and one-eighth inches outside diameter. Porcelain plugs hold the tubes permanently in position. The area of the inside tube is over twelve square inches and that of the outside tube over sixteen square inches. These two large surfaces are presented to each other at a distance of three thirty-seconds of an inch, making a very short air-gap. In Figure 1 A-A represents the telephone line, and is held firmly against the outside tube by a tie-wire which passes through the center of the arrester. G is the ground wire and is soldered to the inside tube at S. The tie-wire is copper and accompanies the arrester when shipped and is

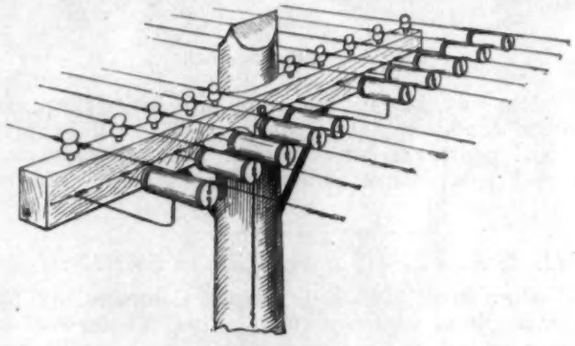


Figure 2.

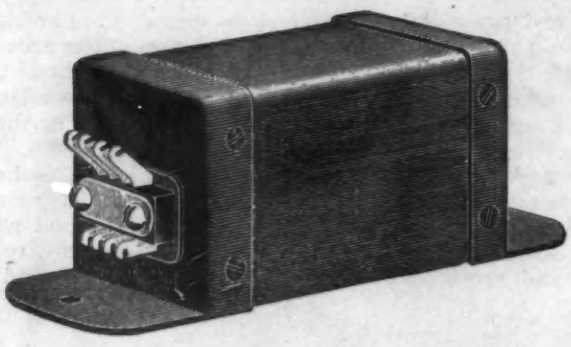
about fifteen inches in length. The arrester, as illustrated in Figure 1, shows a portion of the tubes cut away to show the inside construction. Figure 2 shows an arm of wires protected with Berry arresters. The company will be glad to furnish samples for fifty cents, together with printed matter, to all interested parties.

PREMIER "PHANTOM" COIL.

THE new Premier phantom circuit repeating coil, as manufactured by the Premier Electric Company, 56 West Van Buren street, Chicago, Ill., should be kindly received and fill a long-felt want of operating companies, who are familiar with the great possibilities and immense saving in line construction which the phantom scheme of transmission and signaling have made possible. This coil is designed for use on either toll or exchange lines, has been thoroughly tested in actual service, under all sorts of conditions, and has proved of utmost efficiency, meeting any of the following conditions in an eminently satisfactory manner: 1. Duplexing two metallic lines, thereby creating a distinct independent metallic circuit, which can be used simultaneously with the other two, allowing three separate conversations to be carried on at the same time without interference or cross talk. 2. Duplexing one metallic line and creating an independent grounded circuit which may be used for talking or signaling simultaneously with the met-

allic circuit without interference and without detracting from the efficiency of the metallic circuit. 3. Dividing a heavily loaded metallic line and using it as two separate lines without cross talk from one to the other when both are being used at the same time. 4. Extending a bridging line beyond the distant terminal of a metallic line so as to render service absolutely independent of same without interference or cross talk from one to the other when both are being used at the same time. The material used in the construction of these coils is of the best quality throughout. The coils are wound with pure tussak silk insulated magnet wire entirely enclosed in a laminated magnetic field. The case is made of imported Norway iron, is small in size and so designed that it may be readily mounted in any convenient place or position.

A selling price on this coil has been established by the manufacturer, which is well within the reach of the small, as well as the large operating companies, and if you have any conditions which you believe might be successfully met



The Premier phantom coil.

in a phantom way, but are not quite sure, write them, outlining your conditions, and your inquiry will be given prompt and courteous consideration. Request descriptive bulletin and new price at same time and mention TELEPHONY.

THE "PROTECTIVE" CABLE TERMINAL.

THE Protective Electrical Supply Company, of Fort Wayne, Ind., who manufacture the "Protective" can top cable terminal, is the recipient of many complimentary communications of praise for the efficient service rendered by "Protective" Can Top Cable Terminals. Although "Protective" cable terminals have been on the market but about two years, sales have been enormous, and the company is now enjoying the benefits of a large list of satisfied customers.

In designing the "Protective" combination terminal and protector, it was the aim to construct a high grade cable terminal that would afford an absolute protection against lightning and power currents of all kinds, without the use of heat coils, carbon blocks, tubular or mica fuse; to eliminate all pot-heads, and as many wiped joints as possible; to reduce very materially the fuse maintenance, and to provide a terminal so simple in design that any ordinary person can install them. These important features have been accomplished; and notwithstanding the many marked improvements and advantages this terminal possesses, they are supplied at a greatly reduced cost. The company has just issued a new illustrated catalogue, explaining and showing in detail the construction of the "Protective" can top cable terminal, and would be pleased to mail same to any address.

The following illustrations will show in a brief way the principle of the terminal, and give a very good idea of the methods and new ideas which are incorporated into the manufacture of the "Protective," a terminal that affords absolute protection without the use of carbon blocks, heat coils, pencil or mica fuse. The construction of this terminal and the almost right angle at which the terminal plates are set, the brass ground plate, and the fuse wire close to the ground plate, makes it impossible for lighting or any other currents to arc from line side to cable side of terminal. German silver or lead fuse wire each three inches long is used to connect line side to cable side of terminal.

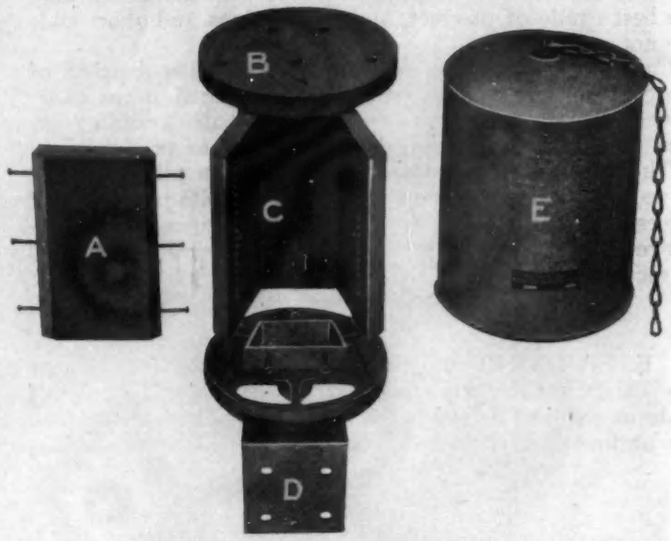


Figure 1.

In Figure 1, part A, shows rear panel of cabinet, which is securely fastened to the two side panels with heavy wood screws and is also fastened to casting with two machine screws and can be easily removed. Part B shows top of cabinet and is fastened to same by five heavy wood screws. Part C shows the interior view of front and side panels of cabinet. This part, as well as parts "A" and "B," are made of thoroughly seasoned hard maple, and is treated by our special linseed oil process, making them absolutely moisture proof. Holes shown in front panel of cabinet are where cable wires are threaded through to terminal plates

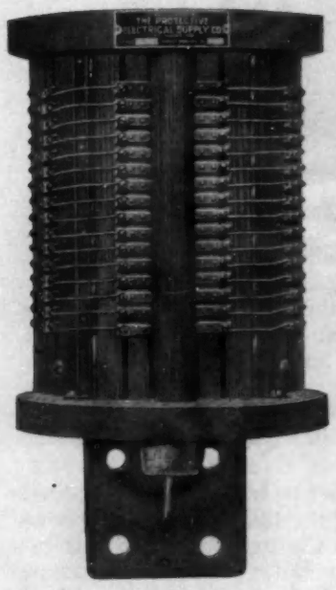


Figure 5.

Figure 6.

on opposite side. Holes shown in side panels are where the distributing wires enter. Part D shows the galvanized iron bracket, the nozzle through which the cable passes, the opening through which distributing wires enter and the cup to which the cabinet is fastened; also the holes in

bracket for fastening to pole. The machine screws shown in cup holds the cabinet securely to casting. The opening in nozzle is a little larger than the cable to be used. The space between nozzle and the cable is filled with solder or melted lead armor which has been removed from cable.

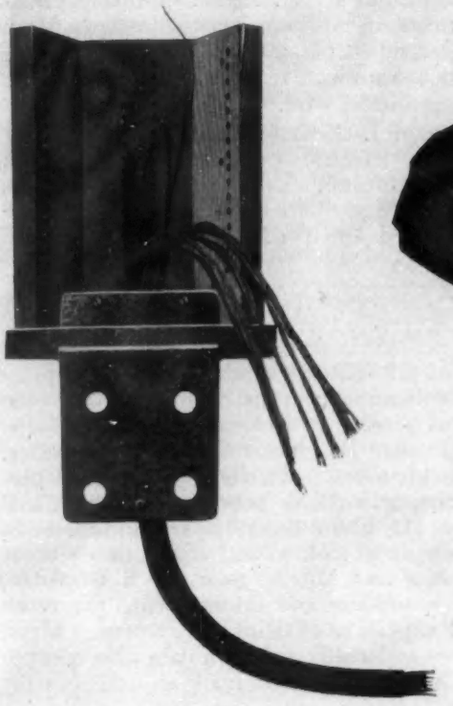


Figure 2.

Figure 3.

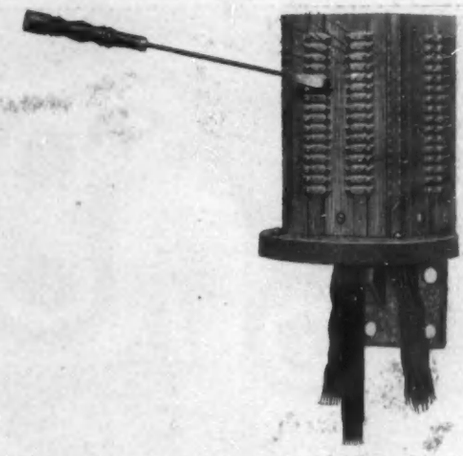


Figure 4.

The bottom of nozzle may be taped to the cable and the space filled with an insulating compound, either of which are recommended. A heavy brass machine screw is provided in bottom of casting to fasten ground wire to. Part E shows galvanized iron cover made of No. 22 gauge steel with lock seam joints and securely soldered, making it perfectly water tight. A strong galvanized suspension chain is fastened to the top of cover.

Figure 2 shows the inside of the front and two side panels of cabinet mounted on galvanized iron bracket, cable placed through and leaded or taped to nozzle, and lead armor removed from cable and part of wires threaded through front panel. It also shows the paper insulation removed from wire even with the hole in front panel through which it is being threaded.

Figure 3 shows the rear panel installed thereby forming an opening in center of cabinet which is being hermetically sealed with an insulating compound, and also shows distributing wires installed and threaded through holes provided for them in side panels of cabinet.

Figure 4 shows the front and side view of terminal, and part of the cable wires connected and being soldered to terminal plates. Also shows the distributing wires connected to the line side of terminal plates. Terminals are furnished with either screw or soldered terminal plates.

Figure 5 shows the front and two side views of the terminal after all cable wires have been connected and soldered to terminal plates and top installed. It also shows fuse wire connecting line side terminal plates to cable side terminal plates.

Figure 6 shows the complete terminal inclosed in the galvanized cover. Also shows the suspension chain by which cover is held to pole when removed from terminal.

Those interested should write the company, and catalogue and prices will be sent upon request.

THE EFFICIENCY OF THE VAC-M ARRESTER.

THE Michigan Electric Specialty Company, Muskegon, Mich., reports that on the night of June 21, 1908, the Kenton Telephone Company of Kenton, Hardin county, Ohio, experienced the worst storm that ever occurred in its history. High winds, incessant and terrific lightning and a heavy fall of rain played the principal parts in the storm. On the following morning only two hundred telephone lines

The Vac-M lighting arrester.

out of a total of twelve hundred were in working condition. Twenty-one buildings were struck by lightning in that county, fifteen head of horses were killed and five barns

burned. The telephone wires in one of the houses struck by lightning were badly damaged, while the telephone remained uninjured. Nearly all of the fuses in the Kenton Telephone Company's cable boxes were burned out and a great deal of county trouble was caused by wind. Not one telephone out of a total of five hundred and sixty farm telephones was injured owing to the fact that these particular instruments were protected with a Vac-m lightning arrester.

JAMES A. KENNY OPENS CHICAGO OFFICES.

JAMES A. KENNY, who is widely known in telephone and electrical circles, has opened offices at 1112-1113 Monadnock Block, Chicago, as a purchasing and selling

James A. Kenny.

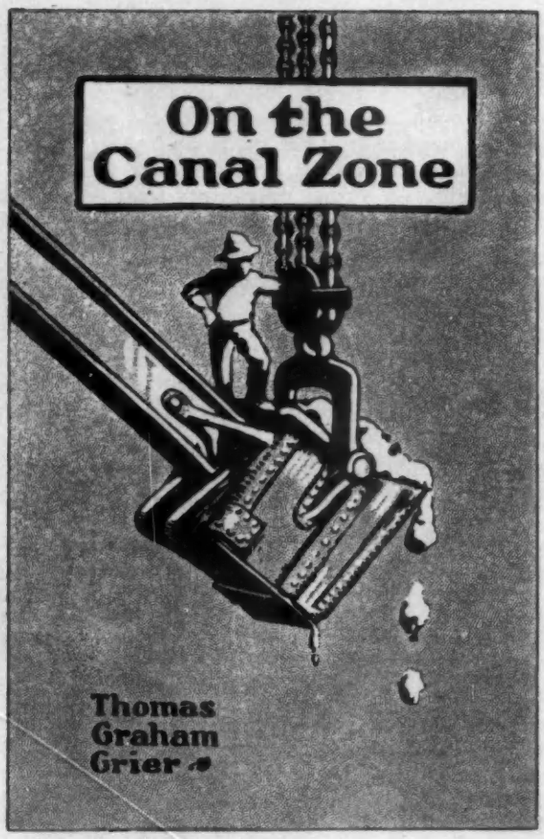
representative for a number of concerns, in the telephone and electrical field. Mr. Kenny resigned the general management of the American Electric Fuse Company, Muskegon, Mich., to engage in his present work, and will represent the complete line of that company.

Mr. Kenny has had fourteen years experience in the telephone field, devoting about four years to the operating end of the business with the Chicago Telephone Company, Central Union Telephone Company and Michigan Telephone Company, after which he entered the employ of the American Electric Fuse Company and worked up to the position of general manager, which he has held for eight and one-half years. Under President Frank G. Jones of the fuse company, Mr. Kenny broadened out, and while a comparatively young man, is thoroughly familiar with both the operating and manufacturing sides of the business. Mr. Kenny will handle the complete lines of the following products: American Electric Fuse Company, fuses, terminals, switchboard protectors, black enamel wire, motor starters, crane controllers, etc.; C. H. Thordarson Electric Manufacturing Company, Chicago, transformers, bell ringers, complete line of ignition apparatus, and experimental electrical machinery; Edward Bonville, Fairhaven, Vt., electrical slates, plain, marbleized and enameled; Tousey Varnish Company, Chicago; C. W. Marsh Company, Muskegon, switchboard, cleating and mechanical leathers of all kinds; Empire Electric Company, Plainville, Conn., switches, handles, etc.; American Insulated Wire and Cable Company, Chicago, insulated wire.

Mr. Kenny is a son of J. C. Kenny, assistant purchasing agent of the Western Electric Company, Chicago, and will make his home in Chicago. His wide circle of friends and acquaintances will be glad to know that he has gone into business for himself, and predict a highly successful outcome of his venture.

NEW BOOK BY THOS. GRAHAM GRIER.

THOS. GRAHAM GRIER, of Chicago, known to practically every telephone man in the country as "the 1900 Battery man," is also a traveler and author of some note, having written a number of clever books and sketches, chiefly descriptive of his tours. Mr. Grier's latest and perhaps his most interesting work is entitled "On the Canal Zone." In this book Mr. Grier describes and illustrates in breezy style a trip which he took to and across the Isthmus of Panama in February and March, 1908, the illustrations, which are particularly profuse and catchy, being the result of Mr. Grier's own expert work with the camera. Maps, time tables, anecdotes and really valuable data also contribute toward making Mr. Grier's latest book an exceptionally



Cover design of the new book.

interesting volume. It is from the press of the Wagner & Hanson Co., Chicago, and will be sent postpaid upon receipt of $1.00.

REDUCTION IN TELEPHONE WIRE.

THE Indiana Steel & Wire Company, of Muncie, Ind., announces a reduction of $10 per ton on all sizes of wire except No. 14, on which it has made a reduction of $5 per ton. The freight allowance, also, will henceforth be actual freight, not exceeding 15 cents per hundred pounds, instead of 25 cents, as heretofore. On carload shipments of 36,000 pounds, or over, there will be a discount of five per cent, with actual freight allowance not exceeding 15 cents per hundred pounds. All terms 60 days, less two per cent for cash in ten days from date of shipment. Such reductions should stimulate telephone construction, and are said to be out of proportion to the decline in other products. The excellent quality of Indiana wire is generally recognized and its manufacturers have been loyal supporters of TELEPHONY and the telephone field.

ROSS-HULL ELECTRIC COMPANY.

THE Ross-Hull Electric Company, Columbus, O., has been gradually building up one of the cleanest and most desirable telephone businesses enjoyed by any concern in that section of the country. Hard times, which generally prevailed elsewhere the past year, failed to affect the trade of this excellent house—in fact, its telephone business has shown a steady and substantial growth. A complete line of high-grade apparatus and supplies is carried and quotations will be promptly furnished, together with all desired information.

TRADE NOTES.

THE F. BISSELL COMPANY, of Toledo, Ohio, has recently issued an attractive souvenir advance card which is one of the series showing the experiences encountered by the Bissell frog on its travels and will be mailed to all interested parties upon request.

THE CARBOLINEUM WOOD PRESERVING COMPANY, of New York City, is issuing to the trade its bulletin No. 30, which is very interesting. The booklet contains some valuable information relating to the preservation of ties and crossarms and may be obtained upon mentioning TELEPHONY.

THE DEARBORN ELECTRIC COMPANY, Chicago, Illinois, reports a prosperous season and growing business on its telephones due to their high quality and low prices. The Dearborn telephone catalogue contains a most complete list of telephones, telephone supplies, construction material, etc., and will be promptly furnished upon receipt of a request.

THE AUTOMATIC ELECTRIC COMPANY, of Chicago, Illinois, has closed a contract with the Citizens' Telephone Company, Grand Rapids, Michigan, for a complete automatic equipment to be installed at Lansing. The exchange will have an initial capacity of approximately 1,700 main lines and is expected to be entirely installed by the middle of December.

THE L. M. ERICSSON TELEPHONE MANUFACTURING COMPANY, of Buffalo, New York, has recently closed a contract with the Citizens' Telephone Company, of Columbia, Tennessee, for four sections of its type B switchboard, a main distributing frame and power apparatus. The first two positions of this switchboard will be equipped for series lines using the well-known Ericsson indicator jack. The last two sections will be arranged for farmers' lines and toll lines, and will be equipped with the new Ericsson No. 6 mechanically restoring tubular drop. This drop combines, with a mechanically self-restoring device, the extreme sensitiveness and features of accurate adjustment, which render the Ericsson drops so reliable. Transfers and order wires will be provided for making connection between the various positions. The same company closed a contract with the Pawnee City Telephone Company, of Pawnee City, Nebraska, for a complete common battery central office equipment. The Pawnee City Telephone Company has recently built a new fire-proof building designed especially for their use, and when completed the plant will be a model one. The present equipment consists of two sections of common battery board, a toll board, wire chief's desk and a complete power plant.

A USEFUL SOUVENIR.

THE Swedish-American Telephone Manufacturing Company, Chicago, Ill., is giving out to the telephone trade a substantial and well finished all-metal screw driver. This little tool, unlike many souvenirs, is made for service, and will stand hard usage. Readers of TELEPHONY can secure one of the screw drivers free by writing the Swedish-American Company, and are sure to be pleased with the gift.

A CORRECTION.

IN the article entitled Mutual Induction, by Einar Brofos, which appeared in the July TELEPHONY, formula No. 2 should read

$$Es = 2\pi f C_1 M$$

No 3 should be

$$L = \frac{4\pi T^2 \mu A}{10^9 l}$$

And No. 4

$$\text{Tang. } \theta_2 = \frac{2\pi f L_2}{R_2}$$

On page 22, column 2, third line from bottom, C should be C_1. Page 24, column 1, twenty-eighth line from bottom, Θ_2 should be θ_2, and θ_2 should be θ_2'. Page 24, column 2, seventh line from top, Ex_1 should be Ex.

A NEW PENNSYLVANIA ORGANIZATION.

AT New Wilmington, Pa., there has been organized the Inter-State Telephone Association, with a capital stock of $1000,000. Nine Independent telephone companies of eastern Ohio and western Pennsylvania are to be consolidated by the new organization, which will thus acquire 3,500 telephones and a thousand miles of wire. It is proposed to establish uniform toll rates and get better accommodations from the bigger companies.

The companies affected by the combination are the Beaver Telephone Company, of Beaver, O.; the North Jackson Telephone Company, of North Jackson, O.; the New Bedford Telephone Company, of New Bedford, Pa.; the Plain Grove Telephone Company, of Plain Grove, Pa.; the Independent Telephone Company, of Slippery Rock, Pa.; the Harrisville Telephone Company, of Harrisville, Pa.; the New Wilmington Telephone Company, and the companies operating at Mount Air and Blacktown, Pa.

My subscription to TELEPHONY having expired with the July issue, I am enclosing you a check for $1 to renew same. The check pays for my subscription to and including the July 1909 issue. I am very much pleased with the journal and look with pleasure to each issue.—*Arthur R. Brick, Crosswicks, N. J.*

Inclosed you will find check for $1, for which please send TELEPHONY to me for one year from date. I would not do without it for $5 a year.—*Yours very truly, Thos. P. Sandyson, Jefferson, N. C.*

CONVENTION PAPERS

Some Interesintg Addresses Made at Recent Independent Telephone Meetings

THE IOWA INDEPENDENT TELEPHONE CLEARING HOUSE.

THE Iowa Independent Telephone Clearing House was incorporated August 10, 1906. Its principal place of business is at Des Moines, Iowa. The object of this corporation, is to promote and regulate interchange telephone service between Independent telephone companies, to pro-rate the earnings and make settlements thereof between companies over whose lines toll messages may pass.

The authorized capital stock is $10,000 divided into shares of $10 each. The capital stock may be increased by the vote of three-fourths of all stockholders.

The officers of our corporation consist of seven directors which are chosen annually by the stockholders. This number may be increased to eleven but cannot be less than five. The directors elect president, vice-president, secretary, treasurer, manager and a traffic committee composed of five members.

The president and secretary are ex-officio members of the traffic committee, but all have always been active members. All directors must be stockholders and each stockholder is entitled to one vote and one only, regardless of the number of shares of stock owned. The indebtedness shall not exceed two-thirds of the capital stock.

The board of directors may make and alter by-laws which shall be in full force and effect after their adoption by the board of directors and until the same are altered or modified by the stockholders at their annual meeting or a special meeting called for the purpose. Amendments may be made to the articles at any annual meeting by the stockholders or at any special meeting called for the purpose, provided a majority of all the stock issued votes for such an amendment.

Any officer in our corporation becoming in any way connected with other telephone interests than those identified and known as Independent companies shall be regarded as having tendered his resignation as an officer or director and the board of directors may proceed to appoint his successor, and any one accepting an office does so with this express understanding.

The president presides at all meetings, signs the name of the corporation to all certificates of stock and to all contracts made with telephone companies for the service of the clearing house.

The secretary performs all duties that are customary in the same position in other organizations and also fills the position of treasurer and gives a bond in the sum of $2,000.

The manager carries out the instructions of the traffic committee and gives bond in the sum of $5,000.

The traffic committee exercises general supervision over the business of the corporation and the work of the manager, makes contracts with Independent telephone companies, makes all rules and regulations relating to the handling, reporting, accounting and settling all business done by the corporation.

In all contracts made for the checking of toll line messages apportioning of toll line earnings, it is agreed that the traffic committee shall prescribe all blank forms. The expense for handling the business is paid by a pro-rate assessment against each company upon the gross toll line earnings and commissions to exchanges of all business.

As I have given you our plan of organization, I will now endeavor to give you our method of station checking. We have adopted the Hewes system of exchanging numbers, using three kinds of tickets, "out" "in" and "through," and these are all numbered from one to one thousand. As an example of handling a call: Champaign calls Joliet. The Champaign operator will say "my number is one hundred" and the Joliet operator records it on her "in" ticket in blank space provided for same and at the same time responds "my 'in' number is two hundred" which the Champaign operator records on the "out" ticket in blank space provided. No operator is permitted to complete connection without first exchanging numbers. In case it is necessary to call a through switching station, the calling operator calls the switching station and exchanges numbers in the same way and the through station exchanges numbers with the station called. I cannot commend too highly the system of exchanging numbers for it certainly has reduced the per cent of errors and in case of error it is very easy to locate it.

The next form used by the companies is daily check ledger. One blank to be used for each station with whom you may interchange business. The blank provides for "out" messages as follows: Number of calls, day and night, sent paid, day and night, overtime, messenger, collect. For "in" business as follows: Number of calls, received collect, day and night, messenger, paid out. By entering the tickets each day upon these blanks the footings of each column will furnish all the information necessary for your clearing house report.

All companies make monthly check reports to the clearing house, recording all "out," "in" and "through" calls and giving routing of same. From this report we make our distribution.

The first eighteen months, the clearing house used the message-mile rate basis for pro-rating business. This was arrived at by taking the total revenue collected by any one company for one month, which is the messages sent paid and received collect, deducting the originating commission, coupon discount and terminal charges and dividing the balance by the total air line miles which the messages traveled, giving the average message-mile rate. By multiplying this by the number of miles credited to each company the amount due each separate company was obtained.

While the method was, and is now, used by similar organizations, we found it slightly inaccurate inasmuch as it was an average mileage of all of one company's month's business and not the actual air line miles which each message traveled. As the tariff is based upon air line distance between points of origination and destination and the mileage which the message traveled is determined in the same manner, the average message-mile method of pro-rating dos not differ very materially from our present method except where the message travels over a circuitous route.

The past seven months we have been using the percentage method, which is based upon the actual air line mileage which each message travels from point of origin to junction point then to destination. The work under the percentage basis is handled by an alphabetical card index which shows the rate, mileage and percentage due each company on each message, also the routing of same. In determining these percentages, originating commission and terminal charges were taken into consideration as well as mileage earnings. We thought it best to have the card show the percentages due each on a message, instead of the cents per message for in the case of change of rate the calculations of our index would not be affected.

Having the per cent due each company on a message, by the use of our Morse calculator (a mechanical device which the clearing house had constructed specially for this work) we can arrive at the proportion due each company on any amount of money in an instant. This systematizes the work and it does not require the long training of an office clerk as the index contains all information necessary to guide a person. While the systematizing of the work has proven quite a task, we feel confident it is absolutely equitable and the work is reduced to a minimum.

But there is one problem confronting us that is not so easy to solve. That is, the equitable distribution of business that is paid for in coupons which are sold at a discount. This can be done by indicating what business was paid for in coupons, but this will prove more labor than it is worth and I would caution every one starting a clearing house to steer clear, if possible, of coupons. At present we are handling the coupons discount by taking the total discount of the coupons redeemed during the month and charging each company with the proportionate share according to their earnings, taking the view that coupons are sold to meet competition and each company should stand its proportionate share. This is not equitable, as several companies are charged with discounts that they do not use, and on the other hand quite a per cent of these coupons are accepted in payment of local business.

Having explained the handling of business between clearing house companies, I will now take up the handling of messages which originate on a foreign company and extend onto clearing house lines. This we get from the "in" report of the several companies and we hold each company responsible for the business which it brings onto clearing house lines, but in return it is given due credit for the proportion which would go to the foreign company were it a member of the clearing house. This has proven quite an incentive for each company to make an effort to induce the foreign company to join the clearing house, as he is in a position to tell his neighbor what the clearing house is holding him responsible for.

I have given you our plan of organization and method of handling business, and I presume you would like to know something about the results, for that is the test of the organization. It has brought about a standardization of clerical method, checking between stations, and an absolutely equitable distribution of earnings, which has proven a great incentive to the companies to build long distance circuits; and it does away with the disposition to cut long distance circuits in at the smaller stations, for each company receives its just proportion of line haul and the efficiency of service has been greatly increased.

It also created a standard form for accounting. The printed forms are purchased in large quantities by the clearing house, thus affecting a material saving to the individual companies, which

should be taken into consideration as against the expense for prorating the business.

A detailed statement is rendered to each company, monthly, showing the amount of business transacted with each other clearing house company. Not only does the clearing house arrive at the amount due each company but it also collects and remits all balances to the respective companies. A settlement between companies was an almost unknown thing prior to the organization of the clearing house. It also provides that each company gets its proper proportion of reversed business.

The Independent telephone interests in Iowa consist of so many different companies whose systems are connected with local lines extending out from each exchange; which now, through the medium of the clearing house, enables each company to secure its proportionate share of the rapidly growing toll line business, as equitably as it would under the management of one large company, for the reason that each company continues to maintain its right of way without the necessity of making a large investment in toll lines. And should a long distance company build trunk lines across the state, it could utilize all the present equipment as feeders.—*Paper presented by W. J. Thill at the Illinois convention.*

INDEPENDENT CO-OPERATION.

THERE are two telephone systems in the state of Missouri, and it has been my purpose to find out something about the extent of both systems, while acting as your secretary. My fondest hopes of knowing the entire extent of both systems have not been fully realized, but we have made considerable progress in that direction in the past year.

The two systems are as follows: The Bell telephone system in Missouri consists of the Missouri Bell Telephone Company, the Ozark Bell Telephone Company, the Missouri and Kansas Telephone Company and the Western Electric Company, all owned and controlled by the American Telegraph and Telephone Company, with headquarters at Boston, Mass. The Independent telephone system consists of about three hundred and fifty Independent telephone companies, and fifteen or twenty electrical supply companies, 90 per cent of which are owned, controlled and managed independently one from another. In each town and community, as a rule, the Independent exchange is owned by the citizens of the town or community and managed after their own ideas.

The first named system has complete organization; the management of this system might be favorably compared with a monarchial form of government, or that of Russia; an edict sent from the Czar at Moscow is supreme law all over his monarchy; likewise an edict sent from the American Telegraph and Telephone Company from Boston is supreme law with the Western Electric Company and all other Bell subsidiary companies.

The management of the Independent telephone systems might be favorably compared with a republican-democratic form of government or that of the United States, with many territories not yet admitted to the central government. I make the above comparisons so that I might make the situation plain to you, and impress upon your minds the great need of a more thorough organization of the Missouri Independent Telephone Association.

The management of the Bell Telephone Company advocates the idea that a telephone system is naturally, and by rights should be, a monopoly because of complete organization. We, the Independent telephone operators, were brought into existence because of the arbitrary and monopolistic edict sent from Boston. At one of the first state meetings I ever attended I remember Mr. Gary and others posted in the telephone world pleaded with us to put up money so that a competent attorney might be employed to fight some cases in court and protect Independent inventions, for fear that all Independent telephone manufacturers and operators would be put out of business by the Western Electric Company or American Telegraph and Telephone Company. Strange to say, that what they were trying to prevent us from doing, buying telephones, they are now trying to persuade us to do—to buy telephones. Had the monopoly succeeded in winning its cases in court, none of us would be here to-day discussing how to make low-price telephone service good, but we would be at home doing without telephone service, or paying an unreasonable price for poor Bell telephone service. There would be no mutual telephone companies organized in county school houses, because the bridging telephones now on party farmers' lines would still be in the clutches of the Boston octopus, who until these cases were won by the Independent manufacturers and operators and several years thereafter did not consider the farmer a competent person to use a telephone.

Let us remember that for four years the Bell monopoly sold telephone service in competition with the Independent operators for less than cost of production, with the aim of running the Independent operators out of the field. Our patrons seemed to know the object of the octopus and bought our service, and as a rule they paid no attention to their less-than-cost service. The monopoly now seem to have come to the conclusion that they have been fighting the wrong end of the Independent movement, and have since our last state meeting turned their guns on the Independent manufacturers and supply dealers. Let us be mindful of the past and be as grateful to our friends as our subscribers have been to us.

A monopoly like the Standard Oil Company or the Bell Telephone Company makes no contract with the Independents for the benefit of the Independent; it is all for the "old man" himself, either for a direct profit or to break the Independent ranks somewhere. If they can use you to lick me, you may be assured that they will lay plans to enroll you in their cause. For instance, there is a mutual telephone company in my territory that had connection with all of the Independent exchanges in the surrounding country, north, south, east and west. The Bell company made a toll contract with them, and gave them a 10 per cent rate to a town over a sixteen-mile toll line, and then gave the mutual company 50 per cent commission on that business. I know this to be a fact, because I read the contract.

I would admonish the Independents right here, unless we stand together and look to the future, to what we might be in ten years from now, in place of accepting the bait offered us, we are unmindful of our own interest and unfit for self-government.

There are about three hundred and fifty Independent telephone companies in Missouri; five hundred and thirty Independent switchboards, one hundred and seventy-five thousand to two hundred thousand Independent telephones. There are less than fifty towns that have Bell switchboards, with about fifty-seven thousand Bell telephones. Notwithstanding this fact, there are only sixty-five Independent Telephone companies who have paid their *state* dues the past year. These companies have paid all of the expenses of the state association, $500 of previous years' indebtedness, and Missouri's part of the International Independent Telephone Association dues on one hundred and seventy-five thousand Independent telephones. They have paid the expenses and salary of your traveling secretary, and have the salary of your secretary paid in full to date for the advancement of the Independent telephone system in Missouri. I venture the assertion that the opposition system with only thirty-seven switchboards and fifty-seven thousand telephones in the state has spent ten times the amount for the advancement of its system.

The capital stock paid up in Independent telephone companies in Missouri is $12,000,000, estimating their bonded and floating indebtedness and undivided earnings as at least $13,000,000. We have invested in Independent telephone interest $25,000,000. Let us therefore consider how best to guard the future interest of this vast investment. No industry in the state has done as much to advance the up-to-date methods of commercialism; no industry in the state has done as much for the farmer, to make him content with his occupation and put him in touch with the world. Let us therefore consider well the future of this great public benefactor. We owe this to the public, and we owe it to the success of our past efforts. There is no industry that demands so much co-operation for success as does ours. One Independent telephone company does not make a system. We therefore must depend upon one another for the success of the Independent telephone system. We are here to-day to consider such matters as will settle our small differences, establish rules and regulations (not for our individual plants, as each one of us manage that to suit ourselves) to govern the business relations between us and the advancement of the Independent telephone system of Missouri, to which we belong and point with pride to the fact that we belong to it.

To establish a thorough Independent telephone system in Missouri we must be of one accord on business relations between our different plants; each Independent operator control his own plant, and operate it in a way most satisfactory to himself; but there is a closer business relation between the different Independent telephone plants than any other class of business in the state. Let us therefore spend time and energy in formulating rules and regulations to manage our business relations.—*Paper read by G. W. Schweer at the Missouri Convention.*

NO SLOT MACHINES FOR OKLAHOMA CITY.

THE board of freeholders of Oklahoma City, Okla., has a grudge against telephones provided with a slot for the reception of coins, and has adopted a provision barring telephone slot machines and fixing the penalty for violation of this provision at sixty days in jail and a fine not to exceed one hundred dollars. Any one guilt of the offense of attempting to place a slot machine in the downtown district will have to serve his time on the rock pile, no exception whatever being made.

THE BELL BOYCOTTED.

A BITTER war is being waged against the Cumberland (Bell) Telephone and Telegraph Company at Houston, Miss. The board of supervisors joined the fight by ordering the sheriff to remove all the Bell telephones in the county offices, including the courthouse. Every Bell instrument has been replaced by an Independent telephone.

In The Rural Line Districts

Jay Geraghty was digging post holes the first of the week in preparation for a telephone line.—*Webster Letter, Ann Arbor (Mich.) Times.*

The Farmers' and Merchants' Telephone Company are extending their line north of the Sand Bank school house.—*Myers Letter, Canton (O.) News.*

The farmers' switchboard is being moved this week to the residence of D. W. Beachler. Miss Dilla is to become the new operator.—*Brandon Correspondence, Independence (Ia.) Journal.*

C. C. Nelson has resigned as general manager of the Nicollet County Telephone and Telegraph Company and it has been accepted by the board of directors. His successor has not yet been named.—*St. Peter (Minn.) Free Press.*

Some ten members of the Millersburg and Parnell Mutual Telephone Company are investing their own money for the purpose of putting on a line for themselves. They began the work Tuesday morning.—*Parnell (Ia.) Advertiser.*

Laurel now has telephone connections direct with Onida as well as Okobojo. A local company ought to be able to offer the necessary inducements to secure the fourteen miles' extension from Laurel to Forest City.—*Forest City (S. Dak.) Press.*

H. Soape, manager of the Henderson Telephone Company, was presented by Mr. Will Futch with a petition, on Christmas eve, to close the office on Christmas day. This petition was signed by all the subscribers, and Mr. Soape kindly granted the request, closing the office from 6 a. m. to 6 p. m.—*Henderson (Texas) Times.*

Prof. Green and son and Prof. Cheney were Arago callers Saturday en route to the park. They are at work on the telephone line through the Park now and will soon say hello to Park Rapids.—*Arago Annotations in Park Rapids (Minn.) Clipper.*

A special meeting of the stockholders of the Leonore Mutual Telephone Co. was held in Over's Hall Monday afternoon. The object of the meeting was to consider the matter of providing a permanent home for the switchboard. If we are correctly informed, no definite action was taken, although considerable "rag chewing" was indulged in.—*Leonore (Ill.) Gazette.*

The telephone people have had some trouble the past few days by some one shooting a hole in one of the telephone cables on Garfield street. It would hardly be possible to learn who did it, but the supposition is that somebody with a revolver or gun took a shot at a bird sitting on the cable and instead of hitting the bird hit the cable and severed a number of the wires. This, of course, made it necessary to pry out all the wires in the cable and ascertain the ones which were broken and then reunite them again, which is quite a chore. People should be careful about shooting game that roosts on the telephone wires. It is pretty expensive sport sometimes.—*Holdrege (Neb.) Citizen.*

HOWDY! PETE WHAT DO YER THINK OF THE JOB SO FUR
HEY! PETE IS SHE GASOLINE ER LECTRICITY
BOYS I'VE NO COMPLAINT TER MAKE. BY CRACKY ITS A BULLY GOOD JOB
SLOW DOWN A BIT PETE YOU'LL GIT A HOT BOX
THATS A DAISY CAR BY GEORGE
Brandenburg

Pete Riley, president of the Possum Trot Farmers' Co-operative Telephone Co., came out in his runabout last Monday to inspect the construction of the new lines. He reports the work progressing nicely and says that by all indications the telephones will be in operation within two weeks. When completed the line will extend from Jasper Green's place, north to Boonville, a distance of nine miles, and will have at least eleven subscribers to begin with. Who says we are not coming to the front?—*Waddle Creek Correspondence in Boonville (Mo.) Review.*